The Journal of the International College of Surgeons

Official monthly publication of the International College of Surgeons

VOLUME 34, NUMBER 3
SEPTEMBER, 1960

CONTENTS

GENERAL SURGERY

Treatment of Hepatic Injuries 281
N. Frederick Hicken, M.D., James McAllister, M.D., and Paul Clark, M.D., Salt Lake City, Utah

Esophagoplasty as a Palliative Surgical Procedure for Inoperable Carcinoma of the Esophagus 292
P. J. Chrysospathis, M.D., F.I.C.S., G. Procos, M.D., and B. Golematis, B.Ch., Athens, Greece

Adenoma of the Gallbladder 298
John Harrington Tanous, M.D., F.A.C.S., Paul C. Ilano, M.D., and Alfred Cruz, M.D., Miami Beach, Florida

The Surgeon and Steroids 302
Eugene F. Traut, M.D., Chicago, Illinois

GENITOURINARY SURGERY

Diversion of Urine: A Rectal Bladder and a Continent Pre-Anal Colostomy 309
Lloyd F. Sherman, M.D., and George L. Garske, M.D., Minneapolis, Minnesota

Surgical Correction of Stress Incontinence: Methods and Technics 330
Virgil S. Counsellor, M.D., F.A.C.S., F.I.C.S. (Hon.), D.A.B., Phoenix, Arizona

OBSTETRIC AND GYNECOLOGIC SURGERY

Decompression: A New Aid in the Second and Third Stages of Labor 333
O. S. Heyns, M.A., D.Sc., F.R.C.O.G., W. A. B. Roberts, M.B., B.Ch., D.O. and G. (South Africa), and H. G. Smulian, M.B., B.Ch., D.O. and G. (Rand), Johannesburg, South Africa

OTORHINOLARYNGOLOGIC SURGERY

Carcinoma of the Larynx: A Review 344
S. N. Sarma, M.D. (Cal.), D.L.O. (Lond.), F.R.C.S. (Edin.), F.I.C.S., Dibregah, Assam, India

PLASTIC AND RECONSTRUCTIVE SURGERY

Skin and Cartilage Homografts: New Trends in Research and Clinical Use 353
Lyndon A. Peer, M.D., F.A.C.S., F.I.C.S., I. S. Walia, M.D., and Ruth J. Pullen, R.N., East Orange, New Jersey

The Importance of Early Coverage in the Treatment of Burns 363
Gilbert L. Hyroop, M.D., F.I.C.S., D.A.B., Oklahoma City, Oklahoma

PROCTOLOGIC SURGERY

Benign Adenomas of the Colon and Rectum 368
Robert Park Jr., M.D., F.I.C.S., Garden City, New York

SURGERY OF THE THYROID AND PARATHYROIDS

Neuroplegia and Hypothermia in the Management of Surgical Thyrotoxicosis 372
A. Bobbio, M.D., F.I.C.S., P. Goffrini, M.D., E. Bezzi, M.D., and G. Uleri, M.D., Parma, Italy

THORACIC SURGERY

Trendelenburg's Operation for Pulmonary Embolism: Report of a Case of Successful Intervention with Modified Technic 380
J. Wieberdink, M.D., F.I.C.S., Amsterdam, The Netherlands

SECCION EN ESPANOL

Carcinoma "in Situ" del' Cuello Uterino 387
Oscar Blanchard, M.D., F.I.C.S., Buenos Aires, Argentina

EDITORIAL

Chicago Architects of World Medicine: N. S. Davis, James B. Herrick and Ludvig Hektoen 392
Frederick Stenn, M.D., Chicago, Illinois

NEW BOOKS 404

ABSTRACTS FROM CURRENT LITERATURE 412

COLLÈGE INTERNATIONAL DE CHIRURGIENS
GENÈVE 1935
FOUNDED BY DR. MAX THOREK

The Journal of the International College of Surgeons

Vol. 34 SEPTEMBER, 1960 No. 3

General Surgery

Treatment of Hepatic Injuries

N. FREDERICK HICKEN, M.D., A. JAMES McALLISTER, M.D.
AND
PAUL CLARK, M.D.
SALT LAKE CITY, UTAH

THE mechanistic environment in which man lives is a traumatic one; hence the abdominal viscera are often injured by accidents occurring at home, on the highway, at work or at play. The liver, being the largest and heaviest organ of the body, is often subjected to both blunt and penetrative impacts. It performs so many vital functions that any traumatic insult, of necessity, provokes severe constitutional reactions. Unless these pathologic dysfunctions are corrected, death may follow.

Types of Injury.—The liver is a solid organ that resists compression and is held in a fixed position by strong ligaments; hence it is particularly vulnerable to traumatic forces. Hepatic wounds may be classified as penetrative, lacerative and subcapsular.

Penetrative Wounds.—Wounds of this type perforate Glisson's capsule and damage the parenchymatous tissues. A bullet of small caliber may pass through the liver without causing much damage, or it may sever large blood vessels and bile ducts, resulting in severe hemorrhage or a profuse extravasation of bile (Fig. 1). Not only do high velocity bullets produce a perforative channel, but the kinetic energy of the missile often damages adjacent tissues. In a gunshot blast of the abdomen the impact may tear large pieces of liver without causing much intra-abdominal bleeding.

From the Department of Surgery, University Utah College Medicine and Surgical Service, and the Latter Day Saints Hospital, Salt Lake City.
Read at the Twenty-Fourth Annual Congress of the North American Federation, International College of Surgeons, Chicago, Sept. 13-17, 1959.
Submitted for publication Feb. 19, 1960.

The liver, being the largest organ of the body, is frequently injured by blunt and penetrative forces. At least 50 per cent of patients so injured show damage to other structures, such as the pancreas, spleen, ribs, diaphragm, kidneys and gastrointestinal tract. Treatment is strictly surgical, consisting of (a) control of hemorrhage, (b) débridement of injured liver tissues, (c) drainage of the liver wounds and the abdominal cavity, (d) control of infection with antibiotics and chemotherapy and (e) correction of damages to other organs. Clinical experiences and laboratory data contraindicate the use of oxycel, gelfoam and gauze in the management of hepatic wounds.

Foreign objects, such as bullets, gunpowder, cellucotton, clothing, metal fragments and pieces of bone, are often embedded in the liver substance. These are not well tolerated and must be removed.

Stab wounds, even though they present small cutaneous openings, often inflict considerable damage, severing some of the larger bile ducts and blood vessels, and even detach large segments of the liver. It is not uncommon for the end of a fractured rib to gouge out large defects in the liver, thus permitting both blood and bile to extravasate in the pleural and peritoneal cavities.

Lacerations, Fragmentations and Ruptures.—These injuries of the liver usually occur when the upper part of the abdomen receives a sudden compressive impact. The blunt force often ruptures Glisson's capsule and compresses and macerates the hepatic substance. If the lacerations involve the hilum of the liver, severe exsanguinating hemorrhages may result. As a rule, the traumatic fissures involve the dome of the liver, leaving large, gaping wounds from which both blood and bile escape into the peritoneal cavity (Fig. 2). When multiple lacerations occur they usually converge at one central point, often avulsing or detaching fragments of liver. It is not uncommon to find large "blocks" or wedge-shaped pieces of liver completely separated from the parent structure. When the lacerations extend from the periphery of the liver toward the central zone, in the direction which parallels the bile ducts, there is usually little damage; but if they tear or divide the main ducts, mild peritonitis may result.

Subcapsular Injuries.—When the agitative force is very strong the internal portion of the liver may be damaged, permitting bile and blood to escape into the parenchymatous tissues, yet Glisson's capsule remains intact. This forms an intrahepatic hematoma which, as it increases in size, exerts undue tension on Glisson's capsule until it ruptures, or "bursts." Unfortunately, "delayed rupture" of the liver is seldom recognized until the sudden hemorrhage ushers in the serious complications.

There is a special type of subcapsular injury in which blood and bile collect in the central portion of the liver, forming a large hematoma that drains into the bile ducts and hence into the duodenum. The surface of the liver shows no evidence of injury; there is no free blood within the peritoneal cavity, and often the surgeon fails to recognize the lesions. As the pressure within the hematoma increases, the marginal hepatic tissue becomes necrotic; the seepage of bile continues in bloodclot form, and a large central abscess develops. Hitzrot[1] drained a central hematoma that contained 82 ounces of bile and blood. Sparkman[2] described a "central hematoma" that eroded into one of the larger bile ducts and caused an exsanguinating melena. Studies by Sandblon[3] indicate

these "hidden" hematomas are not recognized until blood and bile escape into the intestinal tract. This clinical syndrome is known as "hemobilia." As a result of his war experiences, Madding[4a] is convinced that "central hematomas" may form if the Glisson's capsule is closed by sutures before the deeper portions of the liver wound have had an opportunity to heal. We encountered 1 such instance, in which a large laceration over the dome of the liver was converted into a central hematoma by the diaphragm's becoming firmly adherent to the edges of the laceration, and thus "sealing off" this pocket. On the forty-fifth postoperative day a large quantity of blood and bile escaped through the bile ducts into the intestinal tract.

Location of Hepatic Wound. — Because of its prominence, the right lobe of the liver is injured in the majority of cases. In 829 cases of hepatic injuries, Madding[4b] found the right lobe involved in 86.9 per cent, the left in 13.1 per cent and both lobes in 3.4 per cent. In 25 cases of injuries to the liver observed in civil practice, we noted that the damage was confined to the right lobe of the liver in 23 instances and to the left lobe alone in 2; in only 1 were both lobes involved. In our experience, the majority of injuries involve the dome and the anterior surface of the right lobe. In 64 per cent of the cases there was only 1 single laceration, and in 36.5 per cent there were multiple separate tears, the maximum number being 8. There were 2 instances in which "central hematomas" had formed, but in both of these they were concomitant lacerations of the dome of the right hepatic lobe, with complete avulsion or severance of the common hepatic bile duct.

Madding stated that 59 per cent of his 329 patients with wounds of the liver had associated trauma to other viscera. In our series the incidence was 56 per cent, with injuries occurring to the pancreas, spleen, kidneys, ribs, diaphragm, stomach, heart and brain. It is obvious that surgical therapy cannot be effective unless these multiple injuries are recognized and corrected.

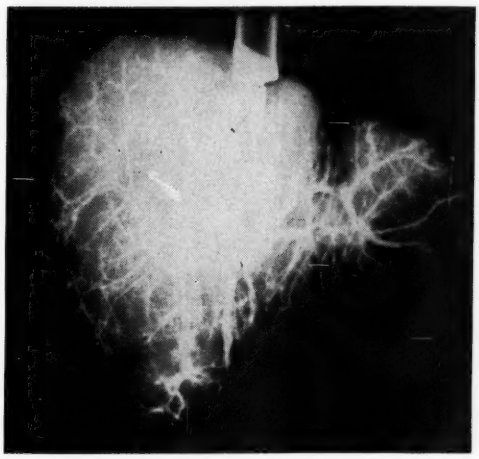


Fig. 1.—Radiation of intrahepatic bile ducts from porta hepatis to periphery of liver. There are no cross communications between larger bile ducts.

Diagnosis. — Hepatic injuries are difficult to recognize and appraise; the clinical signs may be masked by severe shock or obscured by symptoms resulting from injuries to structures, or they may fail to appear for weeks or months. Penetrative wounds present little difficulty in diagnosis, because exploration is obligatory. In dealing with nonpenetrative wounds, however, one must suspect hepatic damage if the ribs have been broken or if severe pressure has been applied to the upper abdominal and lower thoracic areas. Continuous observation is a "must" until all signs of trauma have disappeared, as "delayed rupture" of the liver may not become manifest for weeks later.

Shock.—Sudden shock which occurs as part of the initial trauma, is usually neurogenic because of direct impact on the nerve plexuses within the upper part of the abdomen. This reaction is fleeting and should disappear within a few minutes. True

shock, on the other hand, with its restlessness, tachycardia, hypotension, weak pulse and sense of thirst, invariably indicates serious damage to thoracic and abdominal viscera, associated with acute loss of blood. True shock is seldom associated with cranial or cerebral injuries. Unconsciousness, on the other hand, usually signifies increasing intracranial pressure or damage to the brain stem, but it rarely occurs with injuries to abdominal organs. Campbell[5] has stated as an absolute rule: "The presence of shock following injury to the head is indicative of injury elsewhere until it is proved not so . . . In the presence of shock head injuries should be ignored and the patient treated as if he had any other sort of injury." Shock that persists is usually hemorrhagic or chemical. Shock that occurs hours or days after the injury indicates a subcapsular rupture of the liver or the sudden drainage of a central hematoma into the gastrointestinal tract by way of the bile ducts.

Pain.—This is the most constant symptom of hepatic injury, but unfortunately it occurs also with trauma to other structures in this region. The pain is aggravated by movement of the body or by deep respirations and is often referred to the homolateral shoulder. Accumulations of blood and bile produce the generalized abdominal discomfort so characteristic of disseminated peritonitis. Subcapsular hematomas are often associated with deep, boring pain, which is relentless because of the ever-increasing intrahepatic pressure. Sudden shocklike pain should suggest the spontaneous rupture of such hematomas, with massive irritation of the sensitive peritoneum.

Respiration.—Fractured ribs, rupture of the diaphragm, contusion of the heart and collections of blood and bile in the pleural space often focus attention on the thoracic cage. This is exemplified by a patient with bilateral fractures of the ribs, compression of the sternum and contusion of the heart. When an attempt was made to stabilize the flail chest, the patient suddenly died of cardiac arrest, but autopsy disclosed the lateral half of the right lobe of the liver to be completely detached, and death was due to a severe intra-abdominal hemorrhage. Whenever the diagnosis of fracture of a rib is made, one should always survey the liver and spleen for associated injuries.

Roentgen Study.—Scout films of the abdomen and chest are always valuable in determining the extent of traumatic injuries. Although there are no roentgenologic signs of lacerations of the liver, one can detect the presence of a pneumoperitoneum, fractured ribs, crushed vertebrae or displaced thoracic viscera. Such information is always helpful in estimating the severity of the damage and is of great assistance in selecting the proper remedial measures.

Although an accurate diagnosis of hepatic injuries may not be made with certainty on the first examination, constant observation will soon detect changing values in the basic physiologic patterns, which will permit correct appraisal. The aspiration of blood or bile from the peritoneal or pleural cavity indicates the necessity for exploration. When the clinical symptoms suggest that the liver has been injured, it is much wiser to explore the abdomen than to wait for telltale complications to develop. In such circumstances, the abdominal exploration becomes a surgical biopsy.

Treatment.—There is no place for conservatism in the treatment of injuries to the liver. Prompt, definitive operation is the most effective method of reducing both the morbidity and the mortality rate. Even though the intra-abdominal bleeding should subside spontaneously, the continuous extravasation of bile will exert toxic influences unless it is removed by drainage. The fact that over 50 per cent of the pa-

tients will have associated injuries to the pancreas, stomach, intestinal tract, kidneys, diaphragm and ribs certainly indicates the urgent need for surgical exploration.

The preoperative treatment should be direct and energetic, having as its aim the correction of existing shock. If there is no clinical improvement in blood pressure, pulse rate and hypotension after administration of 1,000 cc. of whole blood, surgical exploration is imperative, because this indicates that there is still progressive bleeding. To postpone operation longer is to intensify the shock and hence reduce the opportunities for recovery. Watchful waiting has no place in the treatment of hepatic injuries.

Adequate exposure of hepatic wounds is absolutely essential to definitive surgical intervention. The incision must be modified to meet existing conditions. If the lacerations involve the dome or the posterior segments of the liver, such wounds cannot be exposed, let alone repaired, through an abdominal incision. It is obvious that a combined thoracic-abdominal approach should be used. If the damage is confined to the ventral surface of either lobe, the abdominal route may prove satisfactory. Regardless of the location of the hepatic wounds, it is necessary to inspect *all* the abdominal organs, in order to detect concomitant injuries. This can usually be accomplished through an abdominal incision, but it may often be necessary to supplement it by opening the thorax.

Surgical therapy has several objectives: (a) to control hemorrhage; (b) to stop extravasation of bile; (c) to remove damaged or nonviable portions of the liver; (d) to drain the liver wounds and the abdominal cavity; (e) to control infection, and (f) to correct traumatic damage to other organs.

Control of hemorrhage requires ample exposure with complete visualization of the hepatic wound, so that each group of blood vessels and bile ducts may be occluded by the direct application of suture ligatures (Fig. 3). This cannot be accomplished unless all blood clots, pieces of liver, bile and serum have been evacuated. The "cupped hand" is an excellent scoop with which to remove this solid and semisolid debris. After this is accomplished the peritoneal cavity can be lavaged with saline solution and aspirated. Contrary to accepted opinion, this maneuver does not increase the hepatic bleeding, as in 91 per cent of all patients hemorrhage has stopped by the time the abdomen is opened. Unless the laceration extends into the hilum of the liver, very little active bleeding will be encountered. Should there be a slight venous

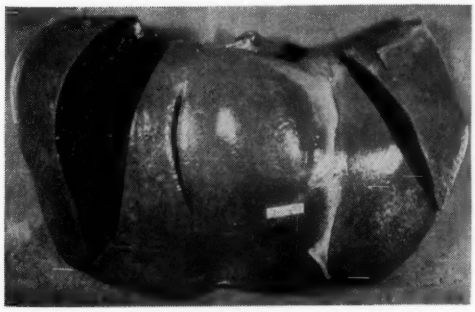


Fig. 2.—Multiple injuries of liver. These are common. Peripheral devitalized segments should be excised.

Fig. 3.—Placement of suture-ligatures around larger bile ducts and blood vessels to minimize leakage.

oozing from the raw surfaces of the liver, the temporary application of a hot gauze pack is sometimes extremely helpful. Arterial bleeding, on the other hand, may be greatly reduced by applying digital pressure (or a bulldog clamp) to the hepatoduodenal ligament for a period not to exceed fifteen minutes. During this interim direct sutures may be applied to the bleeding surfaces.

Experience demonstrates that hemostatic substances, such as gelfoam, oxycel, or gauze impregnated with fibrin, have little value in arresting venous or arterial bleeding from hepatic wounds. The liver seems to reject these foreign substances by extruding them from the bleeding wounds. In experimental work on dogs we lacerated, tore and crushed the lobes of the liver and then packed the wounds with gelfoam, sutured oxycel into the deep lacerations, and even tried to hold these substances in place by employing mattress sutures that went through the entire thickness of the liver substance. These dogs were killed after periods varying from five to ten weeks, and in every instance the liver had extruded these foreign substances. They were either adherent to the outer surface of the liver or were free in the peritoneal cavity. It is obvious that foreign substance, and this includes gauze packing, does not remain in the liver wounds but is forced out by the pressure of the bile and blood that collects behind them. The omentum was the only material, or tissue, that the liver seemed to accept. Ten dogs were studied; the omentum was sutured into the deep recesses of the liver wounds, and the dogs were killed about five weeks later. In every instance there was a dense zone of fibrous tissue, indicating that the omentum had become impregnated with fibroblasts and hepatic cells. In no instance, however, were any ducts or blood vessels seen to transverse this fibrotic zone. It was concluded, from microscopic studies, that the omentum formed a definite fibrous barrier through which neither hepatic vessels nor ducts could penetrate.

What happens to the traumatized liver if it is left alone? In order to answer this question, 15 dogs were subjected to various types of hepatic trauma. In some instances peripheral segments of the lobes of the liver were completely excised and the raw surfaces left open; in others they were crushed. Some were torn, and others were blasted by missiles from airguns, but nothing was done to control the bleeding, stop the flow of bile or débride the damaged structures. The only surgical procedure was the insertion of a large Penrose drain into the depths of the hepatic wounds.

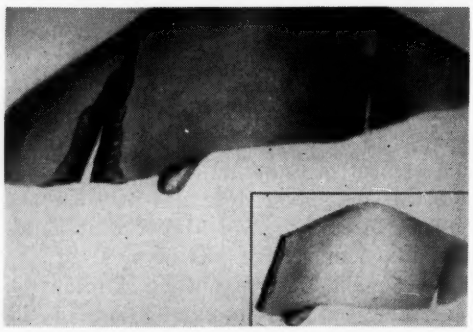


Fig. 4.—Fragmentation of right lobe of liver. Insert indicates proper method of excision.

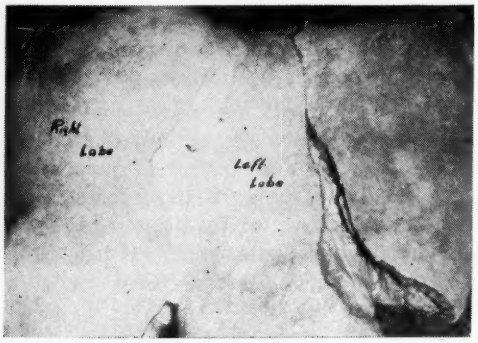


Fig. 5.—Deep laceration involving major portion of left hepatic lobe.

When these dogs were killed, three to ten weeks later, the traumatized wounds had healed spontaneously. There was very little fibrosis, and in some instances it was most difficult to determine where the original laceration, tear or crushing injury had been located. There were no deaths from hemorrhage, no instance of bile peritonitis and no adhesions. This seems to indicate that lacerations, tears, rents or contusions of the liver will heal spontaneously if left alone, and if no foreign substances are employed. Whenever possible, one should ligate the severed bile ducts and blood vessels and insert a drain into the damaged tissues. All other maneuvers should be discarded.

Débridement.—We have been slow in accepting the principle of débridement in dealing with injuries to the liver. The fear of hemorrhage has been the deterring factor. It is common experience, when one is treating a severely damaged liver, to observe small pieces of necrotic tissue seeping out along the drainage tracts for several weeks after the injury. If these devitalized segments had been removed at the primary operation, convalescence would have been more satisfactory (Fig. 4).

When the laceration extends deep into the liver substance, severing the major blood supply to a peripheral portion of the liver, this segment should be removed. If shreds of the liver hang from the margin of the laceration, they should be excised. If the central portion of the liver has been "pulpified" or macerated by penetrative lesions, the intrahepatic cavity should be located with an aspirating needle and opened, the devitalized tissues removed and the area drained. Madding insists that débridement was responsible for lowering the mortality rate associated with hepatic injuries in World War II.

When it becomes necessary to remove a "wedge" or a block of damaged liver tissue, the resulting defect should not be closed or obliterated. This is contrary to opinions expressed in several textbooks on surgery, which demonstrate, instead, that the defect should be overcome by approximating the severed edges of the liver. This problem was taken to the laboratory, where wedge-like segments of the liver 3 by 5 by 6 cm. were removed from various lobes. In some instances these defects were obliterated by approximating the margins of the wound with through-and-through sutures. Two weeks later the dogs were killed. Surprisingly, the retaining sutures had all pulled through the liver substance, and the orig-

Fig. 6.—Defect shown in Figure 5 repaired with through-and-through sutures in attempt to control hemorrhage and restore normal contour to liver.

Fig. 7.—Large intrahepatic abscess. Patient died of bile peritonitis and necrosis of liver. Devitalized segment of liver should have been removed at primary operation.

inal hepatic defects were wide open. There was no bleeding or extravasation of bile. In a control group of dogs, segments of liver were removed and no attempt was made to restore the normal profile. The hepatic defects were left wide open, and when autopsies were performed, ten weeks later, these defects had completely healed, giving the liver its normal contour. From these experiments we conclude that no attempt should be made to restore the normal profile of the liver (Figs. 5, 6 and 7). Leave the defect alone, and nature will close it without difficulty.

Drainage.—Most treatises dealing with hepatic injuries give pictorial demonstrations of draining the lacerated liver by packing it with gauze. It is assumed that the gauze furnishes a matrix upon which the blood cells may clot, exerts sufficient pressure to minimize the arterial and venous oozing and, in addition, functions as a drain. In reality, however, gauze is not a drain but acts as a dam, puddling the blood and bile behind it and thus forming a deep intrahepatic abscess. Madding has pointed out that secondary hemorrhage occurring when the pack is removed can and does become lethal. In spite of the temptation to pack the bleeding zone with substances such as gelfoam, cellucotton and gauze, one should not do so. These materials do not drain; they invite infection, and they form abscesses and often promote secondary hemorrhage (Fig. 8).

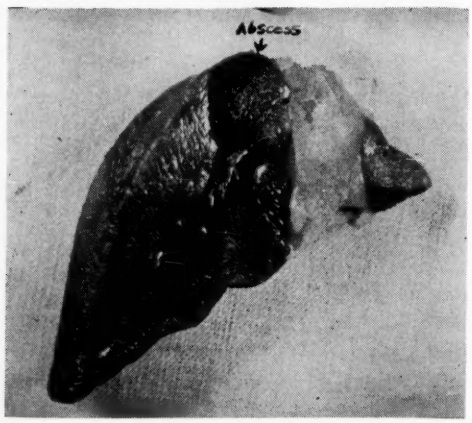


Fig. 8.—Larger lacerative defect in left lobe packed with oxycel. Patient died four weeks later of large residual intrahepatic abscess which could not drain through impervious oxycel.

When one is confronted with wounds of the liver, the blood and bile can be effectively drained by using large pieces of rubber sheeting, solid rubber tubing or large Penrose drains (Fig. 9). In several instances, we have combined the use of Penrose drains and sump suction with great effectiveness. These rubber drains do not adhere to the tissues; they do not promote secondary bleeding, and they furnish an excellent channel for drainage. The Penrose drain should be placed in the deepest portions of the liver wound, not at its margins. The wounds must be kept open until the deeper segments heal; otherwise the peripheral portion may close over, forming a large intrahepatic abscess, which either becomes purulent or breaks into the bile ducts and produces true "hemobilia." In draining an injured liver it is well to place an additional drain in the subhepatic zone, one over the dome of the liver and another along the right cecal gutter, for these are the areas where blood and bile collect to form secondary abscesses. If the lacerations involve the dome of the liver, a large Penrose drain should be placed and anchored in the proper position, deep within the hepatic wound; and additional drains should be placed under the diaphragm and brought out through the thoracic cavity or under the twelfth rib. If such precautions are not taken, the margins of the laceration become adherent to the diaphragm and seal off the liver abscess, thus forming a sequestrated intrahepatic lesion.

Infection.—One of the main functions of the liver is to screen and destroy the bacteria that reach it via the portal veins. It

is quite obvious, therefore, that when the liver is damaged bacteria find an excellent medium for growth in the bloody menstruum containing damaged hepatic tissues. In addition, there are often concomitant injuries to the gastrointestinal tract that liberate pathogens into the peritoneal cavity. It seems prudent, therefore, to employ both chemotherapeutic and antibiotic agents to prevent this catastrophe. Wide spectrum antibiotics seem to be preferable.

Associated traumatic lesions can be troublesome and often have primary importance. When the gastrointestinal tract is damaged, the defects must be repaired before peritonitis ensues. Concomitant damage to the pancreas requires drainage, gastric decompression and special attention to the glucogenic functions. Sometimes the spleen is injured, as in 2 of our cases, requiring splenectomy to control the associated hemorrhage.

If the diaphragm is torn, it must be repaired to prevent herniation of abdominal viscera. Extensive damage to the ribs may necessitate a tracheostomy to promote adequate respiration. If such a plan is followed, most pleasing results will be obtained.

Complications. — Inadequate drainage accounts for most of the complications following surgical therapy. If the drains are removed before the bile ducts have been sealed off, there will be collections of bile and pus beneath the diaphragm or in the subhepatic zone. Primary closure of liver lacerations often "seals off" the deeper portions of the wound, giving rise invariably to "central hematomas" that require secondary drainage. The use of antibiotics reduces the virulence of the organisms found in the subphrenic abscesses but does not eliminate the necessity for subsequent drainage. It is much easier to drain these abscesses by using large Penrose drains than to permit abscesses to form.

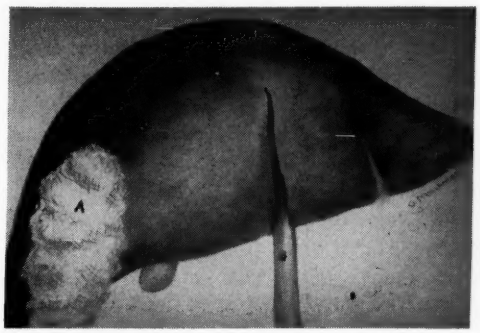


Fig. 9.—Gauze packs *(A)* should never be employed for drainage. Rubber drains *(B)* placed in deepest portion of damaged area provide adequate and safe method of drainage.

Pulmonary complications have been particularly troublesome whenever ribs have been broken or the diaphragm perforated. A prophylactic tracheostomy provides an angle airway and permits proper aspiration of the tracheobronchial tree. Postoperative pneumonia has been eliminated since these procedures were adopted. One should not wait for atelectasis and pneumonitis to develop but should employ these prophylactic measures.

Subcapsular rupture of the liver can be dramatic, unexpected and lethal. In our opinion it is better to resort to exploration if any damage is suspected, rather than to await such catastrophes.

ZUSAMMENFASSUNG

Die Leber als grösstes Organ des Körpers ist häufig Verletzungen durch stumpfe oder eindringende Kräfte ausgesetzt. Wenigstens die Hälfte solcher Patienten erleiden auch Schädigungen anderer Gebilde, etwa der Bauchspeicheldrüse, der Milz, der Rippen, des Zwerchfells, der Nieren oder des Magendarmkanals. Die Behandlung ist bedingungslos chirurgischer Natur und besteht in a) Kontrollierung von Blutungen, b) Wundtoilette, c) Drainierung der Leberwunden

und der Bauchhöhle, d) Bekämpfung von Infektionen mit Antibiotika und chemischen Mitteln und e) Versorgung der Schädigungen anderer Organe. Die Verwendung von Oxycel, Gelfoam und Gaze bei der Behandlung von Leberwunden ist auf Grund klinischer Erfahrungen und nach Ergebnissen von Laboratoriumsuntersuchungen als kontraindiziert anzusehen.

RÉSUMÉ

Le foie étant l'organe le plus volumineux du corps humain il est souvent soumis à des lésions pénétrantes ou par contusion. Dans au moins 50% des cas les lésions atteignent également d'autres structures organiques telles que le pancréas, la rate, les côtes, le diaphragme, les reins et le tube digestif. Le traitement est exclusivement chirurgical et consiste: a) à juguler l'hémorragie; b) à débrider les tissus hépatiques lésés; c) à drainer les plaies hépatiques et la cavité abdominale; d) à combattre l'infection par les antibiotiques et la chimiothérapie; e) à réparer les lésions d'autres organes. Les expériences cliniques et les données de laboratoire contreindiquent l'utilisation d'oxycel, de gelfoam et de tampons de gaze dans le traitement des plaies hépatiques.

RIASSUNTO

Il fegato, essendo il viscere di maggiori dimensioni del corpo umano, è soggetto con frequenza ai traumi chiusi e a quelli penetranti. Almeno il 50% di questi pazienti presentano cotemporaneamente lesioni di altri organi, come il pancreas, la milza, le coste, il diaframma, i reni, il tubo digerente. La cura è strettamente chirurgica e consiste a) nel controllo dell'emorragia, b) nelle sbrigliamento delle parti distrutte di tessuto epatico, c) nel drenaggio delle ferite epatiche e della cavità abdominale, d) nella cura dell'infezione con antibiotici e chemioterapici, e) nel trattamento delle lesioni eventuali degli altri organi. L'esperienza clinica e i dati di laboratorio fanno sconsigliare l'uso della cellulosa ossidata, della spugna di fibrina e della garza nella cura delle ferite del fegato.

RESUMEN

El hígado, por ser el órgano más grande del cuerpo es lesionado frecuentemente en los traumas contusos o penetrantes. Por lo menos un 50% de los traumatizados del hígado presentan lesiones de otros órganos tales como páncreas, bazo, costillas, diafragma, riñones y tracto gastrointestinal. El tratamiento es extrictamente quirúrgico y consiste en: a) control de la hemorragia; b) debridamiento del tejido hepático lesionado; c) drenaje del hígado y de la cavidad abdominal; d) combatir la infección con quimoterapia y antibióticos y corrección de las lesiones de otros órganos. La experiencia clínica y los datos de laboratorio contraindican el uso de oxicel o de la espuma de fibrina y gasa en este tratamiento.

SUMARIO

O fígado, sendo o maior orgão do corpo, é frequentemente traumatisado por choques e forças penetrânção. No mínimo 50% dos pacientes assim traumatisados exibem lesões de outras estruturas, tais como pancreas, baço, costelas, diafragma, rins e tráto gastro-intestinal. O tratamento é extritamente cirurgico, consistindo de: a) contrôle de hemorragia, b) debridamento de tecidos hepáticos traumatisados, c) drenagem das feridas hepáticas e da cavidade abdominal, d) combate às infecções com antibióticos e quimioterapia e e) correção das lesões dos outros orgãos. Experiências clínicas e dados de laboratório contra-indicam o uso de oxycel, gelfoam e gase no manuseio das feridas hepáticas.

REFERENCES

1. Hitzrot, J. M.: Subcutaneous Injuries of the Liver, Ann. Surg. 66:50-61, 1917.
2. Sparkman, R. S.: Hemobilia Following Traumatic Rupture of Liver, Ann. Surg. 138:899-910, 1953.
3. Sandblom, P.: Hemorrhage into Biliary Tract Following Trauma, Surgeons 24:571-579, 1948.
4. Madding, G. F.: (a) Wounds of the Liver, Surg. Clinc. North America 38:1619-1629, 1958. (b) Injuries of the Liver, Arch. Surg. 70:748-756, 1955
5. Campbell, E., and Whitfield, R.: Emergency Management of Injuries of the Head and Spine, Surg. Clin. North America 36:1295-1307, 1956.

Important Notice to All Journal Contributors

PLEASE NOTE AND ACT UPON the following points in submission of your manuscripts:

1. Every article intended for publication in the Journal should be **typewritten in double or triple space** and sent DIRECT to the Editorial Office, Journal of the International College of Surgeons, 1516 Lake Shore Drive, Chicago 10, Illinois, together with all illustrations, legends, tabular matter, bibliographic references the author desires to include. Manuscripts so submitted will be promptly acknowledged and, on acceptance by the Editorial Board, published as soon as possible. The Journal **cannot be held responsible for loss, failure of acknowledgment, delay in publication or nonpublication of any manuscript, or any subsidiary material appertaining thereto, which has not been submitted through the official editorial channels.**
2. Every article presented at any Regional, National, International or Federation Congress of the International College of Surgeons, if Journal publication is desired, should be submitted in the same manner, PLAINLY MARKED with the **name, date and location of the Congress at which it was presented.**
3. Manuscripts **delivered in person to Congress officials or others** have NOT been submitted for publication in the Journal. The Editorial Office has no way of knowing whether they were delivered for publication or for press purposes only.
4. Manuscripts delivered to Congress officials or others **for press purposes only** should be sent by the recipient to the Public Relations Bureau of the International College of Surgeons, NOT to the Editorial Office.
5. If illustrations are desired and it is impossible to submit them at the time the manuscript is submitted, the notation "Illustrations to come" should accompany the latter; otherwise the article may be scheduled for publication before the illustrations have arrived. The Journal absorbs the cost of three halftone illustrations four inches high, or the equivalent thereof. The author may include additional illustrations as desired.

These requests are made not only to safeguard the Journal from error but in the best interests of our contributors. To make sure of prompt acknowledgment and efficient handling of your Congress presentation, please send it DIRECT to its ultimate destination!

Esophagocoloplasty as a Palliative Surgical Procedure for Inoperable Carcinoma of the Esophagus

P. J. CHRYSOSPATHIS, M.D., F.I.C.S., G. PROCOS, M.D.

AND

B. GOLEMATIS, B.CH.

ATHENS, GREECE

DURING the past ten years the results of surgical treatment of various diseases of the esophagus have been more favorable, owing generally to the advances continually being made in medicine and surgical technic. Modern esophageal surgery in particular has greatly progressed, and in many cases of esophageal carcinoma once considered inoperable the patients are now subjected to radical surgical measures.

Nowadays although extirpative surgical procedures are frequently employed for malignant lesions of the esophagus, the results of follow-up study of the patients operated on are still disappointing, causing many surgeons to become hesitant and doubtful in performing such serious operations. Indeed, there is now a tendency to limit the indications for radical operation on the esophagus, because of the high mortality rate (20 to 60 per cent) and the poor results from the standpoint of survival.

Some surgeons, accordingly, have directed their efforts toward palliative surgical methods, returning to earlier conservative operations for esophageal carcinoma, with or without roentgen therapy. In this paper we should like to discuss a palliative surgical procedure, which we have employed in our clinic, which bypasses the unresectable tumor of the esophagus with a segment of the large intestine (right or left colon) to reestablish the continuity of the alimentary tract and to restore the patient's ability to swallow. We give preference to the right half of the colon when possible.

Before discussing this method, we think it necessary briefly to recapitulate the palliative surgical procedures that have been employed in treating esophageal carcinoma. These are as follows:

1. Simple gastrostomy. Until recently

From the Second Surgical Department, University of Athens School of Medicine, Athens.
Submitted for publication April 7, 1959.

Three cases of inoperable carcinoma of the esophagus successfully treated by palliative antethoracic esophagocoloplasty are reported, with satisfactory results from the standpoint of survival. The authors accordingly recommend this procedure for nonresectable esophageal neoplasms, because of the low postoperative mortality rate and the rapid recovery. The rationale of treatment is explained and the technic described.

this method was the most common means of surgical palliation in cases of esophageal malignant obstruction, because of its simplicity. It permitted one to feed the patient and to prevent dehydration. It did not, however, solve the problem of the obstruction, and there remained the impossibility of feeding the patient by mouth, as well as the other disagreeable sequelae that accompanied this method (skin reactions to gastric juice, etc.). Generally, it seems doubtful that life is prolonged by gastrostomy. It is now used only as a preliminary step to the following procedures.

2. Intrathoracic palliative resection with end-to-end anastomosis. This is possible only in a limited number of cases. The advantages of this method is that the patient's alimentary continuity is restored and he becomes able to swallow; on the other hand, the method carries a high operative mortality rate and yields poor survival results.

3. Intrathoracic simple by-pass anastomosis by means of an intestinal loop, without resection. This procedure has its proponents and its opponents. It restores the continuity of the alimentry tract and the ability of the patient to swallow, but the mortality rate is not much lower than that of radical operations.

4. Prethoracic simple by-pass anastomosis achieved by employing a transplanted loop of intestine, preferably the colon. This palliative method reduces the operative risk to a minimum, and in our opinion it is preferable to the aforementioned palliative surgical technics in cases of unresectable malignant esophageal growths, for the following reasons:

a. The continuity of the alimentary tract is re-established.
b. Opening of the chest is avoided.
c. The ability to swallow food is restored.
d. Postoperative recovery is early.

Allison was the first to by-pass the esophageal obstruction by using the jejunum. Later, Rapond and Kucera repeated this procedure in 2 cases of unresectable carcinoma of the esophagus. Other surgeons have also employed it in cases of malignant esophageal lesions (Scanlon, etc.). In our clinic a palliative operation is performed if the tumor is inoperable or if radical operation would involve a high operative mortality rate.

The indications for radical operation in

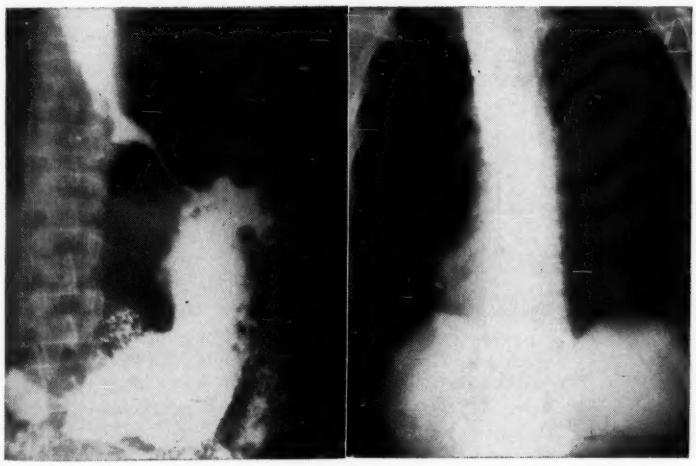


Fig. 1.—Preoperative and postoperative roentgenograms in Case 1.

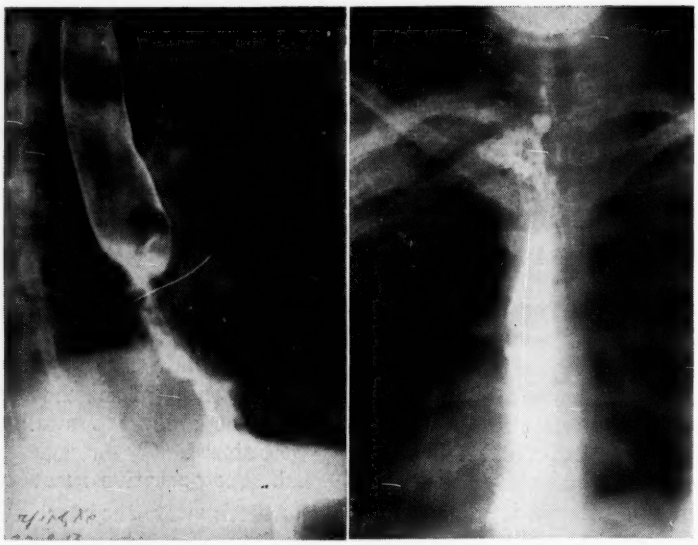


Fig. 2.—Preoperative and postoperative roentgenograms in Case 2.

cases of esophageal carcinoma are as follows: 1. Good general condition of the patient. 2. Absence of distant metastases. 3. Noninvolvement of adjacent structures by the tumor.

According to the international literature, these requirements are met only in 10 to 15 per cent of cases. In the remainder, radical extirpation of the lesion is not possible and the only solution is palliation.

D'Allaines has expressed the opinion that when the tumor is unresectable a palliative anastomosis could be performed in half of the cases in order to by-pass the obstruction. The survival results of such palliative operations are equivalent to those of the radical procedures, and the operative mortality rate is much lower.

REPORT OF CASES

CASE 1.—A 47-year-old farmer was admitted to the Second Surgical Department on Feb. 13, 1957. He complained of a feeling of retrosternal discomfort, progressive dysphagia of solid food at first and liquid later, and of loss of weight extending over six months. His general state of health seemed rather good. Roentgen examination showed an obstruction of the lower part of the esophagus. After adequate preoperative preparation we decided to operate, starting with an exploratory laparotomy, which revealed an extensive unresectable tumor of the lower part of the esophagus, involving the cardia. We performed an esophagoplasty, using the right half of the colon, which was successfully transposed subcutaneously to the cervical region and was anastomosed end to end with the esophagus and end to side with the anterior surface of the stomach. At the same time a temporary gastrostomy was done in order to feed the patient during the first postoperative days. The postoperative course was uneventful. On the tenth postoperative day we started feeding the patient by mouth, and on the thirteenth day the gastrostomy tube was removed. The patient was discharged from the hospital after twenty-five days, able to swallow. He was still active after more than two years after the operation.

CASE 2.—A man aged 65 was admitted to our clinic on Sept. 29, 1958, complaining of the same symptoms as those of the patient in Case 1, of eight months' duration. Roentgen examination showed the lower part of the esophagus to be obstructed. The general state of health was rather good.

The patient was properly prepared, and

after an exploratory laparotomy, at which the tumor was proved inoperable, we decided to perform an antethoracic esophagoplasty, utilizing the left half of the colon (part of the transverse and the descending portions). (Transposition of the right half of the colon was impossible because of an anatomic abnormality of the right colic artery.) The operation ended with a temporary gastrostomy.

Postoperative Course.—The patient was soon able to swallow. He recovered and gained back some of his preoperative weight. After thirty-five days he was discharged from the hospital in good health. He was still well a year and a half after the operation.

CASE 3.—A man aged 52 was admitted to our clinic on Oct. 1, 1958, complaining of the usual symptoms, which had been present for thirteen months. The lesion was located in the lower part of the esophagus, as was shown by a roentgenogram. At the operation the tumor was judged unrejectable, as infiltrating the cardia and adjacent structures. The blood supply of the right colon was insufficient to encourage us to transplant it, and so we used the left colon, which was as usual placed subcutaneously. Operation was finished with a temporary gastrostomy.

Postoperative Course.—Between the tenth and the twenty-second postoperative day regurgitation occurred. It was treated by injections of atropine twice a day for ten days. After this interval regurgitation subsided. The gastrostomy was closed on the twenty-fourth postoperative day. The patient left the hospital after thirty-five days, able to swallow, and was in good health six months after the operation.

Technic of Presternal Esophagocoloplasty.—Starting with a mideline abdominal incision (hyperhypoumbilical), the first task, if the tumor is inoperable, is to mobilize the colon. If transposition of the right half of the colon is possible, we isolate a part of the ileum (10-15 cm.) from the ileocecal valve (cecum and ascending colon).

For testing the adequate blood supply of the isolated loop through the middle colic artery, before ligation of the right colic and ileocolic vessels, these are temporarily clamped for ten minutes. If, for anatomic reasons, the right half of the colon cannot be pedicled on the right colic artery, the middle colic artery can be used for the purpose. Generally, arteries and veins are separately occluded.

Having measured the distance between the stomach and the cervical region, we proceed to transect a sufficient length of the mobilized portion of the large intestine.

Intestinal continuity is reestablished by end-to-side ileotransverse anastomosis.

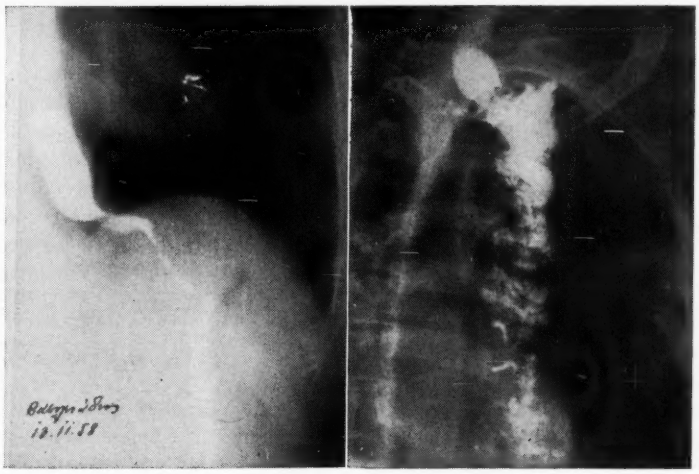


Fig. 3.—Preoperative and postoperative roentgenograms in Case 3.

When the abdominal phase of the operation is finished, the incision is extended to the left parasternal region; and the transplant is drawn up and is placed subcutaneously.

The cervical portion of the esophagus is transected and anastomosed end to end with the proximal end of the isolated loop.

We prefer this suture in two interrupted layers of fine silk.

The distal end of the transplanted loop is implanted in the anterior wall of the stomach, near the antral area. The operation is finished with a temporary gastrostomy for feeding during the early postoperative period.

When the right half of the colon cannot be mobilized owing to abdominal distribution of the vessels, we use the left half (of transverse and the descending portions) after occluding the middle colic vessels. We have always obtained a sufficient length from the left half of the colon.

A disadvantage of this procedure is the antiperistaltic direction of the transplant, which sometimes causes regurgitation and a slight sensation of delayed passage of food. This was observed in 1 of our patients. It responded favorably to injections of an antispasmodic.

The continuity of the intestinal tract after transposition of the left half of the colon is reconstructed by an end-to-end transverse sigmoidostomy. We prefer this type of anastomosis. Rudler has suggested that it is wiser to resect the ascending portion and part of the transverse portion of the colon, thus creating an ileosigmoidostomy.

CONCLUSIONS

Although the cases reported are few and the follow-up is insufficient to prove that life is prolonged by employing palliative extrathoracic esophagocoloplasty, on consideration of the reports of similar cases in the literature we came to the following conclusions:

1. Palliative antethoracic esophagoplasty, with use of the colon, is a good and simple method of treatment for inoperable esophageal carcinoma.

2. The right half of the colon (part of the ileum, cecum and ascending portion) is preferred when possible, pedicled in the right colic artery.

3. If the left half of the colon is employed (part of transverse and descending portions), a sufficient length of viable intestine can easily be transplanted.

4. The operative mortality rate, compared with that of other palliative procedures, is very low, because the chest is not opened.

5. Probably the most valuable effect of the operation is restoration of the patient's ability to swallow.

6. The procedure can easily be employed even for carcinoma of the cervical portion of the esophagus.

7. Preferably the operation is done in one stage,* combined with temporary gastrostomy.

*In cases of cicatricial stricture of the esophagus we perform this operation in two-stages by carrying out an end-to-side esophagocolic-anastomosis and using the oral end of the colon for feeding purposes after implanting it at the cervical region (P. Chrysospathis, J. Internat. Coll. Surgeons 27:656, 1957).

RÉSUMÉ

Les auteurs décrivent trois cas de carcinome inopérable de l'oesophage, traités avec succès et un taux de survie satisfaisant par oesophagocoloplastie palliative antéthoracique. Les résultats obtenus encouragent les auteurs à recommander cette méthode qui présente les avantages d'une faible mortalité postopératoire et d'un rétablissement précoce.

ZUSAMMENFASSUNG

Es wird ueber drei Faelle von nicht resezierbarem Speiseroehrenkrebs berichtet, die mit einer palliativen plastischen Operation der Speiseroehre und des Kolons vor

der Brustwand behandelt wurden und eine befriedigende Ueberlebensdauer aufwiesen. Die Resultate ermutigen zu einer Empfehlung des Verfahrens bei nicht resezierbaren Geschwuelsten der Speiseroehre, weil die Operationssterblichkeit gering ist und eine fruehzeitige Erholung eintritt.

RIASSUNTO

Vengono riferiti tre casi di carcinoma inoperabile dell'esofago trattati con successo mediante esofagoplastica palliativa antetoracica con un soddisfacente periodo di sopravvivenza. Questi risultati incoraggiano l'autore a caldeggiare questo metodo in ogni caso di tumore inasportabile dell'esofago, tenendo conto della bassa cifra di mortalità post-operatoria e della pronta guarigione.

RESUMEN

Se da cuenta en este trabajo de 3 casos de carcinoma inoperable del esófago, tratados con una esofagoplástia anterorácica paliativa con un tiempo de supervivencia satisfactorio.

Estos casos animan a los autores a recomendar este proceder en casos de tumor inoperable del esófago teniendo en cuenta la baja mortalidad postoperatoria y el pronto restablecimiento.

SUMARIO

Comunica os resultados satisfatorios obtidos em tres casos de carcinoma eso fagiano inoperaveis. Pela baixa mortalidade e recuperação rapida o A. se anima a recomendar o metodo ora proposto.

BIBLIOGRAPHY

Allison: Brit. J. Surg. 37:1, 1949.

D'Allaines, I.; Dubost, et Galley, J. J.: Oesophago-gastrostomies palliatives sans resections dans les cancers de l'oesophage et du cardia, J. de chir. 65:289, 1949.

Dubost, C. and Bernier, E.: Un précedé d'allongement de l'anse intestinale au cours de l'oesophagoplasty préthoracique, Rev. chir. 69:193, 1950.

Lafargue, P., and others: Oesophagoplasty préthoracique à l'aide du colon droit et de l'ileon terminal, Mem. Acad. Chir. 77:362, 1951.

Rapand, V. C., and Kucera, J.: Le Karske Listy 3:16, 1948.

Rudler, J. C., and Lafargue, P.: Les esophagoplasties avec le tube digestif. 55e congrés Français de Chirurgie, information rapports et discutions, 1953.

Rudler, J. C.: Sur 28 oesophagoplasties préthoraciques avec le colon pratiqulées pour cancer de l'oesophage, Rev. chir. 70:193, 1951.

Scanlon, F. E., and Staley, C. J.: The Use of the Ascending and Right Half of the Transverse Colon in Oesophagoplasty, Surg., Gynec. & Obst. 107:99, 1958.

Scanlon, E. F.; Staley, C. J., and Moss, W. T.: Palliation in Carcinoma of the Oesophagus, 38:1231, 1958.

Everything in the world is alive. Everything that seems to us dead seems so only because it is either too large or, on the contrary, too small. We do not see microbes, and heavenly bodies seem dead to us, for the same reason we seem dead to an ant. The earth is undoubtedly alive, and a stone on the earth is the same as a nail on the finger.

—*Tolstoy*

Adenoma of the Gallbladder

JOHN HARRINGTON TANOUS, M.D., F.I.C.S.,* PAUL C. ILANO, M.D.**
AND
ALFRED CRUZ, M.D.§
MIAMI BEACH, FLORIDA

A CAREFUL search of the literature has revealed that only a few isolated cases of cholecystic adenoma have been reported.[1]

Apparently, either adenomas of the gallbladder are seldom observed in surgical or necropsy specimens, or little importance has been attached to them. According to Wellbrock's report of 9,550 cholecystectomies at the Mayo Clinic[2], "69 adenomas of the gallbladder were found. All but four of the tumors were found in the fundus of the gallbladder, and two were malignant." Sex was of no significance, as 47 of the tumors occurred in female and 22 in male patients. The presence or absence of calculi did not influence the occurrence of tumor. Recent reports provide additional evidence that these tumors are relatively rare. Swinton and Becker[3] analyzed 4,553 operations of the gallbladder performed at Lahey Clinic, in only 7 of which were benign tumors present—3 adenomas and 4 papillomas. Of the cases of 425,000 new patients observed at the Cleveland Clinic from 1921 to 1951, proved papillomas of the gallbladder were present in only 8.[4]

Adenomas practically always occur singly, but there have been cases in which more than one tumor was known to be present. They are usually semisolid and oval, occupying either part or all of the wall of the gallbladder in the fundus. Histologically (Fig. 1) the tumor is composed of glandular structures which vary in size, shape and form. The glands are lined with tall columnar epithelium, and in some cases the cells are stained with bile.

Clinical Features. — Benign tumors of the gallbladder are generally asymptomatic and may be discovered accidentally, either in the gallbladder after surgical removal or at necropsy.[5] In our case, however, this

*Director, Tumor and Cancer Service, St. Francis Hospital, Miami Beach, Florida; Senior Attending Surgeon, St. Francis Hospital; Assistant Attending Surgeon, Jackson Memorial Hospital, Miami; Instructor in General Surgery, University of Miami Medical School; Visiting Staff: Mount Sinai Hospital, Miami Beach, and Mercy Hospital, Miami.
**Senior Resident in Surgery, St. Francis Hospital, Miami Beach.
§Resident in Surgery, St. Francis Hospital, Miami Beach.
Submitted for publication Sept. 23, 1959.

A case of adenoma of the gallbladder is reported in which the clinical picture of severe chronic cholecystitis was present. The patient has been entirely asymptomatic since cholecystectomy was performed.

Various opinions with regard to this rather rare condition are cited, and the authors suggest that its possible existence should be considered when the clinical signs and symptoms of cholecystitis are present and the cholecystograms are apparently normal. With the current improvement in radiopaque materials and diagnostic methods, more of these tumors should be diagnosed preoperatively.

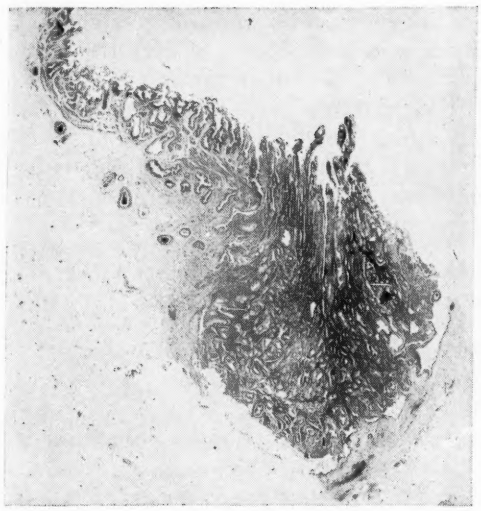


Fig. 1.—Tumor composed of glandular structures varying in size, shape and form.

Fig. 2.—Negative shadow in region of fundus of gallbladder.

patient showed typical symptoms of chronic cholecystitis, despite normal cholecystograms, for two years; a cholecystogram taken on May 20, 1959, however, revealed abnormalities (Fig. 2).

Lund and Burman[7] reported 1 case in which the symptoms were caused by a long papilloma of the gallbladder with ball-valve action into the cystic duct; a case of acute cholecystitis and obstruction due to a pedunculated papilloma.

The relation of papillomas to malignant disease of the gallbladder has been a matter of controversy. In the opinion of Halpert[8] there is no significant relation. The possibility of malignant change in a preexisting benign tumor, however, cannot be completely dismissed. Wellbrock[9] observed malignant change in 2 of his 69 reported cases.

Cholecystographic Diagnosis. — Adenomas of the gallbladder are rarely recognized by roentgenographic study, owing to their structure and location,[10] and even then such a tumor does not appear as an outpouching filled with dye, but rather as a slight bulging into the lumen of the fundus. Clinical diagnosis of benign tumor of the gallbladder, however, was made correctly for the first time by Kirklin in 1931.[11] He observed that the gallbladder is well visualized and the defect rounded, usually less than 5 mm. in diameter and maintaining a constant position even on reexamination. Cholecystographic diagnosis has received marked impetus since that time, and numerous reports have appeared in the literature in which preoperative diagnoses have been made on the basis of cholecystographic data.[12]

Improvement in roentgenographic technics has made such progress that in some cases diagnoses of malignant disease are now being made.[13]

REPORT OF CASE

G. S., a 52-year-old white woman, was admitted to the service of Dr. David Rothrock at St. Francis Hospital, Miami Beach, on May 18, 1959, with a diagnosis of chronic cholecystitis, in spite of earlier normal cholecystograms. A repeat cholecystogram taken on May 20 revealed "poorly defined radiolucency in the fundus of the gallbladder"[6] (Fig. 2). The patient was taken to the operating room on

May 25, and through a right subcostal incision the gallbladder was observed to present a tumor-like mass at the fundus. A routine cholecystectomy was done, and the gallbladder was opened by the pathologist, Victor O. Calderin. Frozen section revealed a benign tumor. The pathologic report was that of a small tumor, 1 by 0.7 by 0.7 cm., white and firm. Microscopic examination (Fig. 1) revealed the lesion to be composed of glands with tall columnar epithelium, which was surrounded by an increasing amount of smooth muscle. Edema and focal chronic inflammation were observed.[14]

The patient had an uneventful convalescence and was discharged on the sixth postoperative day. She has been completely asymptomatic since the operation.

ZUSAMMENFASSUNG

Die Verfasser berichten über einen Patienten mit einem Drüsenmyom der Gallenblase, der täglich typische Symptome einer chronischen Gallenblasenentzündung aufwies. Seit Resektion der Gallenblase ist der Kranke völlig beschwerdefrei.

Die Verfasser erörtern verschiedene Ansichten über diese ziemlich seltene Erkrankung und regen an, bei Kranken mit klinischen Erscheinungen von Gallenblasenentzündung und negativem Cholecystogramm an die Möglichkeit dieser gutartigen Gallenblasengeschwülste zu denken.

Die Verbesserung der Kontrastmittel und der diagnostischen Technik dürfte dazu führen, dass diese Geschwülste häufiger vor der Operation erkannt werden.

RÉSUMÉ

Les auteurs décrivent un cas d'adénomyome de la vésicule biliaire qui présentait le tableau clinique typique d'une cholécystite chronique grave. Les symptômes ont complètement disparu après une cholécystectomie.

Les auteurs émettent diverses opinions quant à ce cas assez inhabituel et pensent que ces tumeurs bénignes de la vésicule biliaire devraient être envisagées chez les malades présentant une cholécystite clinique avec cholécystogrammes négatifs.

Il devrait être possible, grâce à l'amélioration des produits opacifiants et aux progrès de la technique de diagnostic, de poser plus souvent un diagnostic pré-opératoire dans ces cas.

RESUMEN

Los autores presentan el caso de un adenomioma de la vesícula biliar que semejaba una colecistitis crónica grave con sintomatología típoca. El enfermo quedó completamente asintomático después de la colecistectomía.

Los autores exponen varias opiniones en relación con esta afección más bien rara y sugieren que tales procesos benignos deben ser considerados en los casos de enfermos con colecistitis clínica y colecistograma negativo.

Con el progreso de las técnicas diagnósticas y de los materiales radiopacos será posible diagnosticar mayor número de estos tumores preoperatoriamente.

SUMARIO

Os autores relatam um caso de adenomyoma da vesicula biliar, que apresentou um quadro de colecistite cronica grave, no qual o paciente diáriamente apresentava os sintomas típicos da moléstia. O paciente estava completamente assintomático desde que lhe fora feita colecistectomia.

Os autores apresentam várias opiniões em relação a esta condição relativamente rara e que estes tumores benignos da vesicula biliar sejam levados em consideração em pacientes com colecistite clinica e colecistogramas negativos.

Com o aperfeiçoamento dos materiais radiopacos e das tecnicas de diagnóstico, maior número destes tumores podem ser diagnosticados pré-operatóriamente.

RIASSUNTO

Gli autori presentano un caso di adenomioma della colecisti con quadro clinico di grave colecistite cronica, in cui l'infermo presentava ogni giorno i segni tipici della malattia. Egli guarì completamente dopo la colecistectomia.

Gli autori passano in rassegna le varie opinioni su questa malattia piutosto rara, e ritengono che questi tumori benigni della colecisti debbano essere presi in considerazione ogni volta che i malati hanno il quadro clinico della colecistite cronica, ma la colecistografia è negativa. Con il miglioramento delle tecniche di indagine e dei mezzi di contrasto è ora possibile diagnosticare preoperatoriamente molti di questi tumori.

REFERENCES

1. Abell, Il. Papilloma and Adenoma of the Gallbladder, Ann. Surg. 77:276-280, 1923. Ochsner, S., and Carera, G. M.: Benign Tumors of the Gallbladder, Gastroenterol. 31:266, 1956.
2. Wellbrock, W. L.: Am. J. Surg. 23:358, 1934.
3. Swinton, N. W., and Becker, W. F.: Tumors of the Gallbladder, S. Clin. North America 28:669-672, 1948.
4. Kane, C. F.; Brown, C. H., and Hoerr, S. O.: Papilloma of the Gallbladder, Report of 8 Cases, Am. J. Surg. 83:161-164, 1952.
5. Bockus, H. L.: Gastro-enterology. Philadelphia: The W. B. Saunders Company, 1946. 1st ed., vol. 3, pp. 631-633.
6. Piech, V., and Bate, D.: Personal communication.
7. Lund, N. M., and Burman, C. E. L.: A Case of Acute Cholecystitis and Obstruction Due to Pedunculated Papilloma, Identical with Attack of Acute Cholecystitis and Gallstones, Brit. J. Surg. 38:390-392, 1951.
8. Halpert, B.: Gallbladder Neoplasms; Pathology. St. Louis: The C. V. Mosby Co., 1953. 2d ed., pp. 844-847.
9. Wellbrock, W. L.: The Occurrence and Possible Significance of Adenoma of the Gallbladder, Am. J. Surg. 23:358-360, 1934.
10. Young, T. E.: So-called Adenoma of the Gallbladder, Am. J. Clin. Path. 31:423-437, 1959.
11. Kirklin, B. R.: Cholecystographic Diagnosis of Papillomas of the Gallbladder, Am. J. Roentgenol. 25:46-50, 1931.
12. Moore, C.: Cholecystographic Diagnosis of Papillomas and Tumors of the Gallbladder, Am. J. Roentgenol. 33:630-635, 1935. Jones H. W., and Walker, J. H.: Correlation of the Pathologic and Radiographic Findings in Tumors and Pseudotumors of the Gallbladder, Surg., Gynec. and Obst. 105:599, 1957.
13. Cimmino, C. V.: Carcinoma in a Well Functioning Gallbladder, Radiology 71:563, 1958.
14. Calderin, V. O.: Personal communication.

TO OUR CONTRIBUTORS ABROAD

In order to assure all our contributors the same meticulous editorial attention and careful presentation of their work, the *Journal* from now on will be able to accept for publication only those original articles which are submitted in the English language. **Please have your article translated, therefore, prior to submission.** It should be **typed in double or triple space throughout** (see announcement on p. 291) and addressed **clearly** to the Editorial Department, *Journal of the International College of Surgeons*, 1516 Lake Shore Drive, Chicago 10, Illinois.

Your cooperation in this respect will not only insure better presentation of your material but will be a substantial aid in enabling us to publish your work more promptly.

The Surgeon and Steroids

EUGENE F. TRAUT, M.D.

CHICAGO, ILLINOIS

WITH today's pharmacopeia, the surgeon as well as the internist must have fundamental, practical knowledge of endocrinology and its older brother, biochemistry. Although "steroids" is a broad term, for purposes of this discussion it is taken to mean cortisone and its analogues and corticotropin (ACTH).

Selye's important delineation of stress, including surgical trauma, encompasses a series of alterations called the "general adaptation syndrome" evidenced by tachycardia, fever, sweating, hemoconcentration, an elevated sedimentation rate, increased circulating fibrinogen with an increased tendency to clot, leukocytosis, lymphopenia and eosinopenia. These changes are attributed to stimulation of the hypothalamus, the anterior pituitary gland and the adrenal cortex, in that order.[1] Some reason for reservation in the acceptance of Selye's concept in its entirety has been offered.[2]

The failure of the stress mechanism is recognized as shock evidenced by hypotension, persistence of tachycardia, hemoconcentration, hypoglycemia and loss of muscle tone. In countershock, epinephrine and norepinephrine are released from the adrenal medulla. These hormones act to restore vasomotor tone. Epinephrine stimulates the anterior pituitary to increase the production of ACTH. ACTH in turn increases the release of the hormones of the adrenal cortex. The mineralocorticoids act to retain sodium chloride and to restore normotension. The glucocorticoids increase glycogenolysis to elevate the blood sugar level and increase lysis of lymphocytes and eosinophils to raise the gamma globulin level.[3]

The body normally responds to stress by making available increased amounts of corticoids. Instances of improvement or deterioration of rheumatoid arthritis following any surgical procedure have been repeatedly documented. Classically, the patient with latent gout reacts with an acute attack of arthritis in response to trauma, surgical or otherwise. This is the axiomatic acute arthritis in a convalescent surgical patient.

Surgical intervention, with its attendant anesthesia, induces crisis, with possible shock due to failure of the stress mechanism. Viewing the subject broadly, the surgeon would be well advised in assaying a prospective patient from the standpoint of the potential function of his

From the Arthritis Clinic, Cook County Hospital, Chicago. Submitted for publication Dec. 28, 1959.

For the purposes of this article the term "steroids" denotes cortisone and its analogues and corticotropin (ACTH). The author discusses the indications for steroid therapy, its possible side effects and the care with which it should be employed. He points out that the preoperative, and particularly the postoperative, administration of steroid is by no means stereotyped and must be adjusted to the individual patient as indicated by vital signs, biochemical values and the patient's general physical and mental status.

hypophyseal-adrenal axis in times of stress. Thorn's test involves determination of the number of circulating eosinophils in the peripheral blood before and after an injection of adrenocorticotrophin (ACTH).[4] This information will reveal the occasional patient with a constitutionally inferior stress mechanism and will uncover previously unrecognized Addison's disease.[5] The first hint of a diagnosis of Addison's disease has been death in, or shortly after, operation.[6] A total absence of eosinophil response to ACTH is considered an absolute indication for postponement of an elective major surgical procedure.[7]

Drs. Stoker, Czech and I regularly observed impressive eosinopenia in 8 patients subjected to cutting operations during general anesthesia.[8] These were 2 mastectomies for carcinoma; a biopsy of a breast tumor; an abdominal hysterectomy; repair of a chronically dislocated shoulder; resection of the sigmoid; nephrectomy for a Wilms tumor, and a tonsillectomy. Preoperatively, in all instances, the circulating eosinophils numbered 100 to 125 per cubic millimeter of blood except in the child with the Wilms tumor. In her, the circulating eosinophils numbered 36 per cubic millimeter before operation. In the fourth hour after the operation the number of circulating eosinophils was 24. The number of circulating eosinophils remained low or even decreased further for twenty-four to forty-eight hours. In seventy-two hours it had risen to or even exceeded the preoperative levels. This postoperative rise has been called "third day eosinophilia."[9]

The circulating eosinophils were counted in 12 women from four to eight months pregnant, during labor and post partum, in 8 primiparae and 9 multiparae. The prepartum patients had circulating eosinophils approximating the number found in nonpregnant women. A primipara with eclampsia and a multipara with hemorrhage from placenta praevia had a significant lowering of circulating eosinophils. Eclampsia has previously been recognized as a cause of eosinopenia.[10]

During labor the circulating eosinophils completely or almost disappeared. As in the patients subjected to surgical operations, the postpartum eosinophils rose above the antepartum levels within seventy-two hours after delivery. The eosinopenia observed during and immediately after labor did not usually appear until labor was well advanced, most commonly after the patient had been in labor for more than four hours. The type of anesthesia or analgesia, varying from small doses of meperidine (Demerol) to ethylene and ether, did not influence the drop in eosinophils. The primiparous patients showed the most pronounced and persistent eosinopenia. This marked response of the primiparae was equaled by the multipara with hemorrhage due to placenta praevia. The more marked eosinopenia in the primiparae during labor may be explainable by their usually harder and more prolonged labor with a consequent greater output of adrenocortical hormones.[11]

Postoperative shock unexplained by hemorrhage or perforation of a viscus should be investigated for acute adrenal insufficiency.[12] In addition to the falling blood pressure, hyponatremia and decreased carbon dioxide combining power strongly suggest hypoadrenalism. In fact, hypotension after a surgical procedure, especially if it does not respond to blood transfusions or vasopressive drugs, must be considered due to hypoadrenocorticism. Adequate doses of steroids are indicated.[13]

Extensive, prolonged surgical procedures make an old, depleted patient, especially in a urologic service, a candidate for adrenal failure. Some surgeons use steroids in cases of ulcerative colitis and other

depleting diseases to stimulate appetite, promote gain in weight and induce euphoria.[13]

In addition to patients with constitutionally inadequate adrenals or actual disease of the adrenals, such as Addison's disease, today's surgeon must also be concerned about patients to whom adrenocorticosteroid medication is being or has been administered.

The two ways of achieving systemic corticosteroid therapy are: directly, by administering corticosteroids, and indirectly, through stimulation of the adrenal cortex by injecting its physiologic activator, adrenocorticotropic hormone. The patient may be unaware of the steroids previously prescribed. Such information must be sought. Patients with present or past joint disease, allergy, severe colitis, or with inflammations of the skin or eyes should be suspected. The kind of steroid and its dosage ought to be known.

An important side effect of cortisone is its tendency to deplete the body's potassium stores while inducing sodium retention. All the steroids of the cortisone family tend to induce diabetes mellitus or to activate latent diabetes. The clinical manifestations of steroid-induced diabetes are usually mild. Occasionally the diabetes is severe enough to require all the preoperative and postoperative skill necessary to manage patients with this metabolic defect.

Early studies indicated a deleterious effect of steroid therapy on the healing of wounds in experimental animals.[14] Practically, in human surgical experience, delayed wound healing has not been consistently demonstrated.[14] Indeed, corticoids are used almost routinely in operations for rheumatic valvular deformities.

The surgeon must be cognizant of the increased susceptibility of a steroid patient to infection. Infection may lack the usual signs and symptoms. The condition confronting the surgeon may be infection such as cellulitis, peritonitis or empyema, perhaps not requiring an operation but demanding continuation of the steroids in adequate quantities, in addition to suitable antibiotics.

Cortisone and ACTH increase the likelihood of infection, cause latent infection to become active and defeat the body's ability to cope with existing infection.[15] Consequently, adequate doses of antibiotics must be given to patients treated with steroids if infection is present or even threatened.

Surgeons have learned the frequency of fractures due to prolonged steroid medication. Backache in such patients requires careful roentgen consideration of the possibility of steroid-induced osteoporosis.

To the electrolyte disturbances, the diabetogenic effect, the increased susceptibility and lower resistance to infection, the moon face, hirsutism, acne, osteoporosis, possible peptic ulcer, myasthenia, ecchymoses due to arteritis and psychic imbalance due to steroid therapy are added the very important suppression, to the point of destruction, of the adrenal cortex and the anterior pituitary gland. Some or even all of these minor and major complications are unavoidable in patients taking the currently available corticosteroids habitually for their systemic effect. They have not been known to follow steroids administered in ointments or eye drops or as intra-articular or periarticular injections.

The human adrenal gland, in a patient given prolonged corticosteroid therapy, loses weight. Its architecture is grossly distorted. The thickness of the adrenal cortex may be reduced by two-thirds, largely owing to the atrophy of the zona fasciculata.[16]

Much depends upon the duration of steroid administration and the doses used. Adrenal atrophy and hypofunction can be

determined within weeks after treatment is started. Adrenal atrophy of clinical importance must be presumed to exist after a patient has been given steroids for six days and may be detected as long as four and one-half months after discontinuation of steroids.[17] Anybody with a frank history or suspicion of steroid treatment within six months is a likely candidate for shock under stress.

The iatrogenic hypoadrenalism is proportionate to the amount and constancy of steroid intake.

It is important to know the kind of steroid previously used. The metabolic disturbances associated with prednisolone or its close analogues are less than those produced by cortisone. It is also well to know what efforts have been used to prevent or minimize adrenocortical atrophy by using minimal doses of steroids, with omission of the steroids for one or two days weekly, or by the intermittent, concomitant or sequential injection of ACTH.[18] The efficacy of giving ACTH with steroids is not generally accepted.[17] Certainly the secretions of the pituitary and the adrenals are diminished in the patient who is taking steroids. Just as certainly, exogenous ACTH stimulates the adrenal and will repair or maintain its weight at a normal level in a cortisone-treated animal. The failure to respond noted in patients taking corticosteroids may as well be due to pituitary failure or pituitary failure added to the adrenal failure.[17]

Abrupt discontinuance of steroids induces a kind of iatrogenic Addison's disease. Should the patient at this time face unusual stress, such as a surgical operation, the results may be dramatic and disastrous. The previous use of steroids, if followed by sudden stoppage, enhances the possibility of shock in a stress situation such as a surgical procedure. Death from hypo-adrenalism following upon sudden cessation of steroid therapy has been too frequently documented.[19] The surgeon's advice may be sought for a patient with bizarre abdominal conditions (vomiting and abdominal pain) suggesting the possibility of frank or *forme fruste* perforations of ulcers in any part of the gastrointestinal tract. He may face massive bleeding from the stomach or the duodenum. In these conditions, urgent stress syndromes, he faces the necessity of continuing the agents (steroids) responsible for the presenting disease state.

It is pertinent to recall that ACTH, while it protects the adrenal cortex, also increases the pituitary depression already caused by cortisone.[17] Prescribing potassium chloride and calcium gluconate will help to reduce hypokalemia and hypocalcemia, constant side effects of prolonged cortisone administration. Salt restriction, intended to prevent sodium retention, may result in a patient already hyponatremic at the time of surgical treatment.

Desoxycorticosterone acetate, a mineralocorticoid secreted by the adrenal cortex, is indicated in the presence of hyponatremia and shock. It is indispensable in the presence of Addison's disease. Norepinephrine, another product of the adrenal cortex, is used for medical as well as surgical shock.

In order to minimize the electrolyte disturbances, most clinicians have abandoned cortisone in favor of prednisone, prednisolone, Triamcinalone or Dexamethasone.

These newer steroids, more powerful therapeutically, also multiply from three to seven times the adrenal and pituitary depression.

Of course, in this day of applied endocrinology, the referring internist has great obligations. He must fully acquaint the surgeon with the endocrinologic hazards. He must not abandon his patient to the surgical service, but remain ever watchful to advise. He must carefully select,

and keep as small as possible, the number of patients to be given steroids systemically.

In addition to the skillful administration of steroids to patients in surgical states, the surgeon is committed to avoiding or postponing elective surgical procedures for patients who have to take steroids and to the use of local instead of general anesthesia.

Preoperative Preparation. — Preoperative study is possible only with elective operations, not with the emergency.

A patient may be first encountered in shock as result of injury or illness, without an available history. Such a person is a candidate for intensive steroid therapy.[13]

In addition to a general careful physical appraisal, determinations of his circulating potassium, sodium and dextrose, together with measurement of his blood pressure and tests for glycosuria, should be performed in the case of the surgical candidate. The electrocardiographic changes may be helpful in suggesting hypokalemia. More desirable, accurate and quantitative is the chemical determination of the circulating potassium level.

The patient without a major gastrointestinal disturbance and currently taking steroids may continue them orally up to six hours before the operation. Steroids are most economically and effectively used in doses at six-hour intervals.

The amount of steroids employed for the patient facing operation is empirically determined. Maximal stimulation of the adrenal cortices in a normal man weighing 70 Kg. results in the secretion of about 240 mg. of hydrocortisone daily. The administration of 250 mg. of hydrocortisone per day should approach an adequate replacement during severe stress.[20] A patient given oral steroids in the usual minimal doses is ordinarily given 50 mg. of hydrocortisone intramuscularly twenty-four hours before, twelve hours before and immediately before the operation. The patient with a history of maximal doses of steroids must receive proportionately larger amounts preoperatively. Forty units of long-lasting ACTH (Cortrophin zinc or licther gel) is injected intramuscularly before the operation. A patient with a long history of steroid medication should be given 100 mg. of hydrocortisone intravenously during the operation.

Postoperative Care. — Postoperatively the patient is given 50 mg. of hydrocortisone intramuscularly at eight-hour intervals for 3 doses and then at twelve-hour intervals for 2 doses. These doses would be increased or reinforced with desoxycorticosterone and norepinephrine in the presence of a falling or poorly sustained blood pressure. On the third postoperative day the patient may again take his steroids orally. Nausea or vomiting may necessitate prolonging the parenteral use of steroids. Ordinarily the patient is given 3,000 cc. of physiologic solution of sodium chloride, with or without 5 per cent dextrose, on the day of operation and daily until the resumption of oral fluids. The more prolonged and traumatic the surgical procedure, the larger the doses of steroid must be.

The steroid patient about to undergo an emergency operation should be given intravenously 100 mg. of hydrocortisone in 1 liter of physiologic solution of sodium chloride and 40 units of Corticotrophin gel during the operative procedure. He is then treated as aforedescribed.

These precautions do not apply to patients to whom steroids are administered locally—in the eye, on the skin or intra-articularly.

To the patient already in shock not due to blood loss, 100 mg. of hydrocortisone should be given intravenously at once. Hydrocortisone (50 mg.), with appropriate vasopressors, should be given every six

hours thereafter.[20] The metabolic effects of hydrocortisone are observable within one hour after its intravenous injection, with a peak effect in three hours.[21]

The preoperative administration of steroids and, particularly, the postoperative care are by no means stereotyped. Both must be highly individualized as dictated by frequent, painstaking observation of vital signs, of biochemical values and of the patient's general physical and mental status.

ZUSAMMENFASSUNG

Unter der Bezeichnung "Steroide" wird in dieser Arbeit das Kortison und ihm ähnliche Stoffe und das Kortikotropin (ACTH) verstanden. Der Verfasser erörtert die Indikationen der Steroidbehandlung, die möglicherweise auftretenden Nebenwirkungen und empfiehlt Vorsicht bei der Anwendung dieser Mittel. Er weist besonders darauf hin, dass die Anwendung der Steroide vor und vor allem nach einem operativen Eingriff sich keineswegs nach einer starren Form durchführen lässt, sondern den Erfordernissen des einzelnen Patienten, entsprechend seinen lebenswichtigen physiologischen Funktionen, seinen biochemischen Werten und seinem körperlichen und geistigen Allgemeinbefinden, angepasst sein muss.

RÉSUMÉ

Pour les besoins de cet article le terme de "stéroïdes" s'étend à la cortisone et à la corticotropine (ACTH). L'auteur discute les indications thérapeutiques des stéroïdes, leurs effets secondaires éventuels et la prudence avec laquelle ils devraient être employés. Il fait ressortir que l'administration pré-opératoire, et particulièrement postopératoire, de stéroïdes n'est en aucune façon stéréotypée et qu'elle doit être adaptée individuellement selon les symptômes, les valeurs biochimiques, l'état général et l'état psychique des patients.

RIASSUNTO

In questo articolo col termine di steroidi si intende il cortisone e sostanze analoghe e la corticotropina (ACTH). L'autore discute le indicazioni della terapia con steroidi, i possibili effetti collaterali, e le precauzioni che si debbono usare nel corso della cura. Sottolinea il fatto che tanto la terapia preoperatoria quanto quella postoperatoria non sono ancora state regolate definitivamente e debbono, pertanto, essere decise caso per caso a seconda dei sintomi, dalle determinazioni biologiche, e dallo stato generale fisico e psichico del malato.

RESUMEN

De acuerdo con lo que persigue este artículo, el término esteroides se refiere a cortisona y sus análogos y corticotropina (ACTH).

El autor se extiende sobre la terapéutica con los esteroides, sus efectos secundarios y el cuidado con que deben emplearse. Señala tambien como en el pre y sobre todo en el postoperatorio la administración de esteroides es una cosa estereotipada y debe ser amoldada a cada individuo de acuerdo con los signos vitales, los valores bioquímicos y el estado general físico y mental.

REFERENCES

1. Ellestad, M. H., and Reed, J.: Circulating Eosinophils in Cardiovascular Stress, Ann. Int. Med. 36:551-556, Part 2 (Feb.) 1952.

2. Hermann, W. L.; Hayes, M. A.; Goldenburg, I. S., and Schindl, I. K.: Urinary 17-Ketosteroids in Surgical Stress, J. Clin. Endocrinol. 19:849 (July) 1959.

3. Silverstein, M. D.; McGavack, T. H., and Winfield, J. J.: The Impact of Emergency Surgery on Patients with Pre-Existing Disease, Surg. Clin. North America 35:319 (April) 1955.

4. Roche, M.; Thorn, G. W., and Hills, A. G.: Levels of Circulating Eosinophils and Their Response to ACTH in Surgery: Their Use as Index

of Adrenocortical Function, New England J. Med. 242:307 (March) 1950.

5. Hayes, M. A.: Shock and Adrenocortex, Surgery 35:174 (Feb.) 1954.

6. Howland, J. W.; Schweizer, O.; Boyan, C. P., and Dotto, A. C.: Treatment of Adrenal Cortical Insufficiency During Surgical Procedures, J.A.M.A. 160:1271 (April 14) 1956.

7. Thorne, G. W.; Forsham, P. H., and Emerson, K. Jr.: Diagnosis and Treatment of Adrenal Insufficiency. Springfield, Ill.: Charles C Thomas, Publisher, 1950.

8. Thrift, C. B., and Traut, E. F.: Effect of Salicylates on the Circulating Eosinophils and Urinary 17-Ketosteroids in Man, Ann. Rheumat. Dis. 17:108 (March) 1958.

9. Roche, M.; Hills, A. G., and Thorn, G. W.: The Levels of Circulating Eosinophils and Their Response to ACTH in Surgery: Their Use as an Index of Adrenal Cortical Function, Proc. First Clin. ACTH Conference. Philadelphia: Blakiston Company, 1950, p. 55.

10. Parvianen, S.; Soiva, K., and Ehrnrooth, C. A.: The Etiology of Eclampsia with Special Reference to Adrenocortical Hormones, Mercatorin Kirjapaino, Ann. Chir. et Gynaec. Fonniae, 39:1-19 and 1-1450, Supplement 1, Mercatorin Kirjapaino, Helsinki, 1950.

11. Traut, E. F.: Adrenal Cortical Activity Under Various Therapeutic and Physiologic Influences, to be published.

12. Adams, R., and Siderius, N.: Postoperative Acute Adrenal Insufficiency, J.A.M.A. 165:41 (Sept. 7) 1957.

13. Schneewind, J. H., and Cole, W. H.: Steroid Therapy in Surgical Patients, J.A.M.A. 170:1411 (July 18) 1959.

14. Ragan, C.; Howse, E. L.; Plotz, C. M., and others: Effect of Cortisone on Connective Granulation Tissue in Rabbit, Proc. Soc. Exper. Biol. & Med. 72:718 (Dec.) 1949. Ragan, C.: Proc. Conf. on Effects of Cortisone, Merck and Co., Inc. Rahway, N. J., 1951, p. 54.

15. Slocumb, C. H.; Polley, H. F., and Hench, P. S.: Effects of Cortisone and ACTH on Patients with Rheumatoid Arthritis, Proc. Staff Meet. Mayo Clin. 25:476 (Aug.) 1950. Traut, E. F., and Campione, K. M.: Histopathology of Muscle in Rheumatoid Arthritis and Other Diseases, Arch. Int. Med. 89:724 (May) 1952. Traut, E. F.: Exacerbation of Tuberculosis During Treatment with Cortisone, J.A.M.A. 149:1214 (July 26) 1952. Thyroiditis During Treatment with Cortisone, J.A.M.A. 149:832 (June) 1952.

16. Stoner, H. B., and Whiteley, H. J.: The Effects of Cortisone and Corticotrophin on the Human Adrenal Cortex, Lancet 2:992 (Nov.) 1954.

17. Holub, D. A.; Kitay, J. I., and Jailer, J. W.: Effects of Exogenous Adrenocorticotropic Hormone (ACTH) Upon Pituitary ACTH Concentration After Prolonged Cortisone Treatment and Stress, J. Clin. Invest. 38:291 (Feb.) 1959.

18. Hayes, M. A.: Surgical Treatment as Complicated by Prior Adrenocortical Steroid Therapy, Surgery 40:945 (Nov.) 1956.

19. Lewis, L.; Robinson, R. G.; Yee, J.; Hacker, L. A., and Eisen, G.: Fatal Adrenal Cortical Insufficiency Precipitated by Surgery During Prolonged Continuous Cortisone Treatment, Ann. Int. Med. 39:116 (July) 1954.

20. Diraimondo, V., and Forsham, P. H.: Pharmacophysiologic Principles in the Use of Corticoids and Adrenocorticotropin, Metabolism 7:5 (Jan.) 1958.

21. McMillan, C. D.; Powell, N., and Haines, R. D.: The Diagnosis and Treatment of Adrenal Insufficiency, M. Clin. North America 39:111 (July) 1955.

The most drastic deprivation which any person can suffer is that of the freedom to utilize and enjoy the faculties which nature has given him and which his will and desire have developed. Keep a man from exercising his mind, his body, his faculties in the pursuit of his own wishes and delights, keep him from enjoying the fruits of his efforts—and you have done everything evil to him that you can. The greatest desire of each person, in short, is to be free to get the most he can out of life. There is no other way objectively to define social goals than to call them the sum of those individual goals which can be harmonized in society.

—Petro

Diversion of Urine: A Rectal Bladder and a Continent Preanal Colostomy

LLOYD F. SHERMAN, M.D.

AND

GEORGE L. GARSKE, M.D.

MINNEAPOLIS, MINNESOTA

Two cases of carcinoma of the urinary bladder in relatively young men, treated surgically by the Gersuny operation with a modification of the proctologic surgical technic, are presented.

The principles of the diversion of urine and their historical basis background are reviewed with particular reference to the procedure described.

The technic used in the 2 cases is outlined in detail, as are the immediate and final stages of postoperative care.

A SEARCH for a substitute for the urinary bladder is centered largely around the use of various portions of the bowel as reservoirs and conduits. Many years of experience involving experimental and clinical trial and error have demonstrated the real difficulties of providing a functional reservoir and have elicited the factors responsible for dysfunction of the substitutes. Obstruction to the flow of urine, renal infection and absorption of urinary constituents are the main problems. A true substitute for the bladder should protect the kidneys from infection, include noninterference with body fluid and electrolyte balance, permit intermittent evacuation of urine at reasonable intervals under voluntary control (and without the use of catheters or appliances) compatible with a normal social and physiologic existence.

Three essential conditions must be satisfied to make the diversion of urine an ideal operative procedure: (1) correction of the primary pathologic problem or disease; (2) preservation of normal renal function (if present prior to operation), and (3) continence of the urinary and fecal stream.

From the Department of Urology, St. Mary's Hospital, Minneapolis.
Submitted for publication March 15, 1960.

Many procedures have been devised since attempts at such surgical therapy first began to satisfy all three conditions, and all have been met with inconstant success. The indications for such an operation are not numerous, but they are steadily increasing with the ability to perform successfully more extensive and radical surgical procedures.

Urinary diversion is used in several conditions:

1. Exstrophy of the urinary bladder and epispadias.

2. Inoperable vesicovaginal fistula.

3. Intractable interstitial cystitis, or postinflammatory fibrosis with vesical contracture.

4. Advanced vesical tuberculosis when all other forms of treatment fail.

5. Crushing injuries to the pelvis with extensive destruction of the male urethra and/or bladder.

6. Advanced destructive and irreparable disease of the urethra ("watering pot perineum").

7. Extensive scarring or other irreparable damage of pelvic ureters due to operation or irradiation.

8. Cystectomy for carcinoma of the urinary bladder or urethra.

9. Pelvic evisceration for extensive carcinoma of the pelvic organs.

10. Atony of the bladder with ureterectasis, with or without reflux.

11. Neurogenic vesical or sphincteric dysfunction.

This paper is directed primarily to carcinoma of the bladder in the male patient.

An ideal ureteral-intestinal anastomosis must be based on the following principles: 1. The fecal stream should be diverted from the bowel reservoir to prevent ascending infection. 2. Obstruction at the site of anastomosis should be eliminated by a transplantation technic by the direct method. 3. The bowel reservoir receiving the diverted urine should not be too large. 4. The bowel reservoir should either be empty continuously or be emptied frequently, preferably by physiologic rather than mechanical means.

Proximal colostomy and implantation of the ureters into an excluded rectosigmoid pouch and transplantation of the ureters into an isolated ileal segment or sigmoid loop appear to be operations with the potential to satisfy these criteria. We shall present 2 cases of the first procedure in which the modification outlined by Gersuny[1] in 1898 and recently by Lowsley and Johnson[2] was used, avoiding the necessity of a colostomy.

Attempts to divert the urinary stream from a diseased bladder are not new. The first report of such an experimental and clinical procedure is said to have been that of Dr. John Simon in 1852.[3] After experimental studies in dogs, he attempted clinically to divert the urine through a fistulous tract from male exstrophy of the bladder to the rectum. The procedure was performed on 2 patients; 1 died of peritonitis and the other of multiple urinary calculi and renal insufficiency, one year after the operation. In 1878, Thomas Smith tried a direct ureteral transplant into the bowel.[3]

It has been noted that the major difficulties associated with ureterointestinal implants are due to stricture at the point of the anastomosis and to ascending infection of the urinary tract. Obstruction to the drainage of a hollow viscus anywhere in the body predisposes to infection. The end result in such a situation is hydronephrosis and hydroureter, with pyelonephritis and progressive renal insufficiency. Numerous attempts have been made to establish a valvelike mechanism at the site of the anastomosis to prevent reflux of the intestinal contents into the ureter. These attempts have not been successful in preventing either reflux or the subsequent occurrence of an ascending infection. The success of diversionary drainage of the urinary tract may well be dependent upon the formation of an artificial vesical that could be completely emptied at periodic intervals and would not be constantly contaminated by the presence of fecal material.[4] The most nearly ideal substitute would be an isolated segment of the bowel. Tizzoni and Foggi, in 1888,[3] isolated a segment of ileum, closed one end, sutured the other end to the neck of the bladder and implanted the ureters into this pouch, maintaining sphincteric control and allowing the normal vesical sphincter to remain

intact. It is seldom possible to remove the bladder and retain the vesical sphincter in the presence of neoplastic disease; therefore, the clinical use of this operative procedure is necessarily limited, for such tumors frequently involve the trigone and require more extensive operations, and total cystectomy is a prerequisite to any anticipated cures.

In 1906 VerHoogan[3] formed a substitute urinary reservoir by using the ileocecal region with the appendix as a "urethra," hoping to make use of the muscular activity of the abdominal wall as a sphincter to control leakage of urine. In 1950, Bricker and Eisman[4] reported 2 cases in which the terminal segment of the ileum and cecum were utilized for the vesical pouch. The ureters were transplanted into the ileal segment and a cecostomy was performed through which a catheter could be passed for evacuation of the newly formed bladder. In 1952, Merricks and his associates[5] described 5 cases in which total cystectomy was performed and the ileocecal valve remained competent as a sphincter, the cecum and the terminal portion of the ileum being used for the new bladder.

Comments on Common Precedures.— 1. *Cutaneous Ureterostomy*: This is the most unesthetic and annoying of all the diversionary methods. Continual problems of skin sensitivity to contact cement and reaction of the abdominal skin to pooling of urine from the ostea, stricture formation of the ostea, abscesses along the ureter, calculi and/or retraction of the ostea beneath the skin surface, coupled with odoriferous and cumbersome appliances, doom the patient subjected to this procedure to social solitude and economic and renal failure.

2. *Ureterosigmoidostomy*: This requires no external appliances, but the pathophysiologic shortcomings are many, chiefly regurgitation of mixed feces and urine from the bowel to the kidney because of the variation in rectal and ureteral pressures, terminating in chronic pyelonephritis, progressive uremia and hyperchloremia. Pyelonephritis from obstruction and ascending infection is a common cause of tubular damage, although back pressure alone may suffice in some cases. Hyperchloremic acidosis is due to absorption of the urinary constituents in the presence of renal tubular damage.

Although the role of the kidney in the acidosis associated with ureterosigmoidostomy has received considerable attention, the frequent clinical observation of reversal of the acidosis by rectal tube drainage is evidence against this concept. Other contradicting evidence is that greatly elevated serum chloride levels are observed with near-normal nonprotein nitrogen levels. Frequency of emptying the sigmoid of urine and voluntary low chloride and high water intake may explain, in some instances, the failure of acidosis to develop. The nature of the mucosa in the rectosigmoid and the mechanics of flow over the mucosa must also be a factor. There may be a functional change in the absorptive capacity of the sigmoid mucosa after prolonged exposure to urine.

Patients with diversion of the urine to the colon, regardless of how much colon is used or whether only one ureter is transplanted, may lose potassium.[6] Hypopotassemia[6c] (although it causes renal insufficiency and may produce weakness, lethargy and anorexia hardly distinguishable from those associated with terminal carcinoma) is often a relatively asymptomatic disease. The union of the urinary and fecal streams will produce ascending infection, and, although the methods of Cardonnier and Nesbitt were created to eliminate such problems, the problems are nevertheless still present. Stricture formation at the site of anastomosis of the ureter to the bowel is not uncommon. The patient must

avoid hyperchloremia and acidosis by a low salt or salt-free diet and by alkalizers. In addition, catheterization at periodic intervals during the day to prevent the collection of urine in the rectum and thereby prevent absorption and also regurgitation is an inconvenient and hazardous procedure. Except when there is rapid and continuous run-off of urine from a short segment, ureterosigmoidostomy should probably be abandoned.

3. *Isolated Segment of the Cecum:* The operation of Merricks and Gilchrist[5] creates an artificial bladder by use of the cecum and the proximal end of the colon, the ileocecal valve being maintained intact as a sphincter mechanism, with the ostea leading to the abdominal wall. It can produce the problem of the cutaneous ureterostomy type of diversion, with cutaneous reactions to urine and cement, and also may or may not require an abdominal collecting mechanism, although the valve functions in many patients.

4. *Diversion to an Isolated Segment of Ileum (Bricker Operation):* This procedure also places an ostium on the patient's abdomen without control of the urinary stream, subjecting the patient to appliances and cutaneous reactions as well as to the formation of large amounts of mucus and/or calculi. Regurgitation to the upper part of the urinary tract is not totally absent, and a constant source of infection is present.

Bricker[4] reported 118 pelvic exenterations and thirty-two other bladder substitution operations, with an operative mortality rate of 3 per cent. Postoperative pyelonephritis occurred in 20 per cent of cases. Normal upper urinary passages or minimal hydronephrosis was observed six months after the operation in 86 per cent. Hyperchloremic acidosis was not observed. In many respects the operation is ideal for the diversion of urine and substitution for the bladder: 1. Mechanical and technical simplicity make it practical to combine with major resection in stages. 2. Isolation of the ileum from the fecal stream decreases the chance of ascending infection. 3. The wide-open external stoma, with absence of a sphincter mechanism, decreases the chance of back pressure and reflux up the ureters. 4. Segments evacuate promptly through peristaltic action and are always relatively empty. 5. A mucosa-to-mucosa technic for ureteral-intestinal anastomosis lowers the incidence of obstruction and therefore of hydronephrosis and pyelonephritis. 6. The amount of absorption through the intestinal mucosa is of no clinical significance.

5. *Diversion to the Proximal Portion of the Colon:* This procedure has been discarded after the demonstration by Boyce of the tremendous absorptive powers of the colon distal to its most proximal portion adjacent to the cecum.[8]

6. *Diversion to the Isolated Rectosigmoid with Diversion of the Fecal Stream by an Abdominal Colostomy:* This procedure, described by Kinman, Sauer, Huston and Mellick, was associated with a definite absence of hyperchloremia or azotemia and control by the new urinary sphincter, without incontinence, of the urinary stream.[7]

The essential features of this procedure are the permanent separation of the urinary and fecal streams, the relative simplicity of execution, the good functional results accomplished by construction of a diversive single-barrel colostomy at the juncture of the descending and sigmoid portions of the colon and the use of the distal rectosigmoid portion as a bladder substitute to which the ureters are anastomosed. Patients are completely continent of urine during the day, but slight incontinence at night is noted when they are overtired. Incidence of acute pyelonephritis ranges "from less to none." The blood urea nitrogen levels remain normal. Daily irrigation of the colostomy allows control

of bowel function, and colostomy bags are not always necessary. Rectograms show surprisingly low pressure gradients, and sharp peaks in each curve correspond with an urge to empty the rectum, so that such sensation should be adequate protection against excessive pressures within the bladder substitute. The surface of the colon exposed to urine is limited by the dimensions of the rectosigmoid bladder substitute.

Mauclaire[9] suggested this procedure sixty-four years ago, and others have since advocated it (Kroenig;[3] Creevy[11]). Even today the best series of ureterosigmoidostomies show a 45 per cent incidence of hyperchloremic acidosis; therefore, separation of the urinary from the fecal stream is a logical step to take, even though the goal of urinary or fecal continence must be abandoned.

Kinman and others[10] observed rectal defecation pressures of 180 to as high as 280 cm. of water. The major portion of the pressure is due to the action of the diaphragm and abdominal muscles when the subject strains to defecate. This force is, of course, transmitted to the ureter as well as the bowel. Diversion of the colon by colostomy makes straining unnecessary. Second, fecal material is propelled to the rectum under some 80 cm. of pressure by peristaltic contractions extending along the entire length of the colon, with alternate contraction and relaxation and shortening and elongation of one segment after another, progressively toward the anus. Colostomy blocks these progressive waves. A patient with a rectal bladder voids at lower pressure, relying largely on local bowel contraction for emptying, and the need for abdominal straining is minimized because of the liquid content of the rectum. The voiding pressure in the isolated rectum is usually less than 30 cm. of water.[6d]

Acceptance of the colostomy by surgeon and patient alike after radical operations on the rectum is well known. Colostomy should also be accepted as the means of avoiding many complications of ureterointestinal anastomosis. This type of anastomosis has become a clinically less popular procedure, particularly when one considers the other methods of diversion of urine, ureterostomy, nephrostomy and, particularly, the cecal bladder or ureterostomy via an isolated ileal loop. One is faced with two alternatives—the patient must choose between incontinence of urine from the stoma in the abdominal wall, the collecting of urine by catheter or bag, or a colostomy that must be irrigated once a day. Even though feces are more repugnant to the patient than urine, with proper care a colostomy does provide a minimum of discomfort. We are not prepared to decide which arrangement will prove more acceptable and successful from the clinical standpoint, but the rectal bladder with sigmoidostomy offers a more nearly physiologic and a more practical substitute for the normal urinary bladder.

The urine produces a minimal reaction in the isolated rectosigmoid, and although this is not ideally suitable for a substitute bladder, its possibilities were explored as early as 1898 by Gersuny[1] as Foges reported in 1898 and 1899.

7. *Vesical Rectostomy:* In this procedure, first described by Maydl[12] in 1894, the trigone, with the ureteral orifices intact, was implanted into the anterior rectal wall. This had been done on numerous subsequent occasions by other authors. This procedure might be applicable to the patient with exstrophy of the urinary bladder, or intractable interstitial cystitis or severe vesical injury. In the treatment of carcinoma of the urinary bladder, however, for which cystectomy is the procedure of choice, this could not be accomplished and achieve the primary purpose of eradicating the original pathologic condition.

8. *Gersuny (Lowsley-Johnson) Operation:* The answer that would most completely encompass and solve the problems of ureterointestinal anastomosis lies in the Gersuny operation, diversion of the urine to the isolated rectosigmoid, with diversion of the fecal stream to the perineum and avoidance of an abdominal colostomy.

Hinman and Weyrauch,[3] in their review of ureterointestinal implantation, described Gersuny's original procedure. In 1898, using the completely isolated rectum as a urinary reservoir, Gersuny devised an operation intended to maintain continence of feces as well as of urine. He first isolated the rectum and implanted the trigone into the divided rectal lumen after Maydl's method. The proximal portion of the sigmoid was then drawn through an opening made along the anterior margin of the anus and anchored within the anal sphincter, so that this structure could actively control both the newly formed bladder and the sigmoid that served as the new rectum. In 1912, revising the location of the orifices, Bayer[3] attempted to provide separate outlets for urine and feces, using a common rectal sphincter that brought the proximal bowel posterior to the new bladder. Melinkoff,[3] in 1924, modified Gersuny's technic by fashioning the skin of the perineum into a channel intended to serve as a urethra for the newly formed bladder and expressed the opinion that this channel, opening at a distance from the anus, minimized the danger of ascending infection. It was not revived until Lowsley and Johnson[2] reported the case of a 59-year-old man with carcinoma of the urinary bladder, upon whom an operation of the Gersuny type was performed. In 1955, T. H. Johnson reported a two-year, nine-month period of use of the Gersuny operation in 2 cases of carcinoma of the urinary bladder.[3] In essence, the scheme of the operation is as follows: 1. The ureters are anastomosed to the isolated rectum through an abdominal incision. 2. The sigmoid mesentery is dissected to liberate and lengthen the sigmoid. 3. Through a perineal incision immediately anterior to the anus, a plane of dissection is carried under the external sphincter ani muscle to the rectal-vesical pouch. 4. The liberated sigmoid is drawn under the external sphincter ani muscle and out through the perineum; the final result is two perineal openings—separate but adjacent. The anus or urinary outlet is immediately posterior to the perineal sigmoid stoma or the new rectum, both orifices encircled by and under the voluntary control of the external sphincter muscle.

Stonington and Eisman[13] reported 5 cases of carcinoma of the urinary bladder in which this procedure was utilized.

Keefer and Lienke[7] reported 4 cases of exstrophy of the urinary bladder in which this procedure was used, without the complications of the usual diversionary procedures.

Advantages: The advantages of this method are as follows:

1. A separate orifice for the urinary stream, with voluntary control, is provided.

2. A separate orifice for the fecal stream, with voluntary control and sensation, is included.

3. The prevention of regurgitation or reflux of urine to the upper part of the urinary tract is possible.

4. The absorption of metabolites is avoided, since the most unresorptive portion of the intestine is employed.

5. The need of an abdominal orifice and collecting appliances is eliminated.

6. The resulting bladder could be subjected to cystoscopic examination if necessary.

The Gersuny operation potentially meets the three conditions for an ideal ureterosigmoidostomy: (1) control of the primary pathologic process; (2) preservation of

normal renal function, and (3) continence of feces and urine. It provides the patient with two "natural" orifices that do not require collection appliances. Physiologically, an approximately normal voiding pattern, with control and holding of the urinary stream, is possible, and the same situation can conceivably exist with regard to the fecal stream, with a normal filling sensation and emptying reflex. The location of both orifices in the male approximates that which is present in the female, except that the orifices are transposed.

Disadvantages: The disadvantages will become apparent only when this operation has been done many times by various surgeons in various centers. The main problem is that of possible renal damage. Separation of the fecal stream from the urinary stream should abolish any possibility of infection, for in the isolated rectal segment the urine should eventually become sterile and can be maintained in that state with proper perineal care by the patient. Absorption of metabolites with distortion of the electrolyte pattern is prevented by use of the least resorptive portion of the colon.

Possible Postoperative Complications.—1. *Leakage from the ureteral anastomosis.* This can be prevented by the use of a direct mucosa-to-mucosa technic under direct vision and placement of splinting ureteral catheters through an indwelling rectal tube fixed to the perianal skin by heavy silk sutures.

2. *Herniation of the bowel through the open triangle made by the ureter, the rectal wall and the pelvic brim.* This is a possibility.

3. *Redundancy of tissue at the new rectum.* This is purely a cosmetic disadvantage and has been eliminated by Sherman's method of plastic reconstruction as a secondary procedure.

4. *Formation of adhesions.*

Surgical Technic.—1. *Preoperative Preparation:* After a definite diagnosis of carcinoma of the bladder is made and confirmed by transurethral biopsy and bimanual palpation of the area of the lesion, with the patient under anesthesia, has been done at the time of cystoscopic study and its fixation or nonfixation determined, proctoscopic examination and an air contrast study of the colon are done. If an excretory urographic series has not been performed prior to the cystoscopic study and the biopsy, this is also in order. A survey of the chemical pattern of the serum, consisting of values for blood urea nitrogen, creatinine, urea clearance, chlorides, sodium, potassium, carbon dioxide combining power and uric acid, is obtained. A thoracic roentgenogram is taken in search of metastases. Three days prior to the operation a low residue diet is started, and on the day before the operation the regimen of bowel sterilization as recommended by Poth[6a] is established as follows:

At 12 noon (regimen as modified by Johnson[2a]), 60 cc. of castor oil and 1 Gm. of Neomycin are administered, with 250,000 units of Nystatin and 1.5 Gm. of phthalysulfathiozole.

At 1, 2, 3 p.m., 1 Gm. of Neomycin, with 250,000 units of Nystatin and 1.5 Gm. of phthalsulfathiozole is given. These medicaments are administered in the same amounts at four-hour intervals thereafter until the time of operation, excluding the four hours immediately preceding it, in order that the upper part of the gastrointestinal tract may be empty and there may be no danger of vomiting during anesthesia. One hour before the operation a rectal catheter is placed; 1 quart of 1 per cent Neomycin is instilled, and the indwelling rectal catheter is clamped until the time of operation.

2. *Anesthesia:* Pentothal sodium with curare is administered intravenously

with supplemental nitrous oxide and oxygen, via an intratracheal tube.

3. *Technic:* The technic of the procedure is divided into the urologic and the proctologic procedures, the latter consisting of three parts: maneuvers in the abdominal field, maneuvers in the perineal field in the first stage and the revision operation seven to eight days after the first-stage operation.

First Step of Urologic Procedure: Routine urethrocystoscopic examination is first done to determine the status of the urinary bladder as compared with that observed in previous studies, and the biopsy areas are inspected. The bladder is thoroughly irrigated with a 1:5,000 solution of aqueous Zephirin solution, and catheters are passed, if possible, to both renal pelves and left in place. The left catheter with a straight end to indicate the left side (sinestra, left, straight), and the right end cut obliquely or diagonally (dextra, right, diagonal). These catheters are splinted by an indwelling No. 16 French 5 cc. Foley bag catheter, and the bladder is again thoroughly irrigated with 1:5,000 aqueous Zephirin solution. The urethral catheter is connected to an irrigating unit, the flask of the unit being filled with 1:5,000 aqueous Zephirin solution so that the bladder may be filled with fluid as required during the procedure.

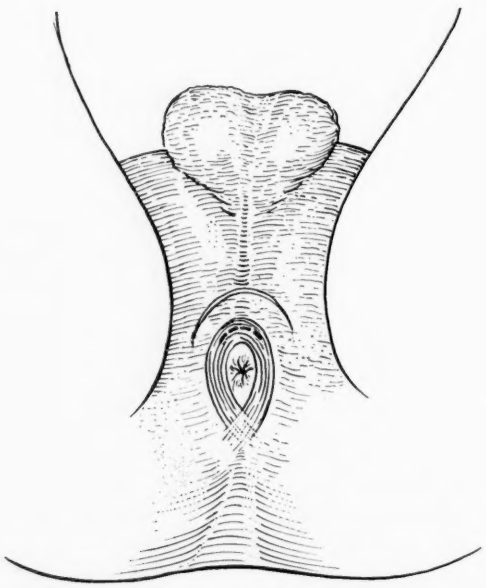


Fig. 1 (Perineal Phase I).—Mobilization of sphincter. Curvilinear incision is made anterior to anal verge in order to expose sphincter muscle.

The patient is placed supine, in the low lithotomy position, with well-padded knee crutches elevated 10 to 12 inches from the level of the table. All catheters and the patient are prepared with an antiseptic solution. The Trendelenburg position, with a sandbag under the hips, increases exposure of the pelvic fossa. A midline incision is made from the symphysis to the midhypogastric area, circumscribing and removing the navel. The rectus muscles are retracted lateralward after incision of the linea alba. The prevesical and preperitoneal areas are explored. The peritoneum is not opened prior to cystectomy unless necessary. The loose tissue of the bladder is separated by blunt dissection; the peritoneum is stripped from the bladder, and the urachus is identified and doubly clamped and divided. The upper stump of the urachus is ligated, and a traction suture is placed in the lower stump. The peritoneum is next stripped from the posterior surfaces of the bladder; if the peritoneum proves to be involved, it is opened and the peritoneal area of involvement is excised widely. The bladder is freed from its peritoneal attachment and pulled upward, and its lateral surfaces are freed by sharp and blunt dissection. The vesical arteries are identified, particular care being given to the lateral vesical pedicles containing the superior vesical artery, because of proximity to the ureter. The ureters can be easily palpated with the indwelling catheters in place. The remainder of the vascular pedicles sup-

plying the bladder are identified and doubly clamped, divided and ligated. The ureters have been identified and are liberated as they enter the area of the bladder. They are divided, including the indwelling catheter within the lumen. At this point the catheters are removed, and polyvinyl No. 6 French catheters are inserted to the pelvis; the ends are treated as aforedescribed, the left remaining straight and the right cut at a diagonal. The indwelling catheters within the ureters are secured by single suture of No. 000 chromic catgut placed at the distal end of the ureter. The catheters are placed to drip outside the operative field. With the bladder empty, the base of the bladder is easily brought up into the wound; and the attached seminal vesicles are stripped from the rectum, and the rectum is completely separated from the posterior surface of the urinary bladder and the prostate. The puboprostatic ligaments are identified anteriorly, divided between forceps and ligated. The vascular plexus is also clamped, divided and ligated. The prostate is separated from its attachments by blunt dissection. This leaves the bladder and prostate attached only by the urethra, which is divided by sharp dissection and left open as a secondary drainage point. The catheter in the urethra is an aid in this dissection, and after the urethra and catheter have been cut across the indwelling catheter is removed. Bleeding in this area can be controlled by packing and then suturing these areas with No. 000 plain catgut. All fatty tissue and lymph nodes in the area are dissected free and stripped down to the great vessels and to the anterior surface of the rectum.

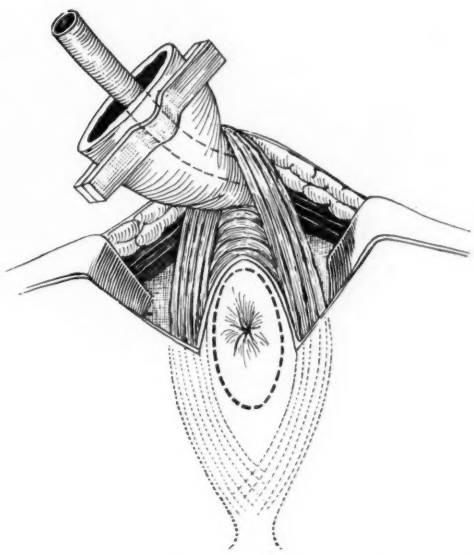


Fig. 3 (Perineal Phase I).—Division of sphincter. Large mushroom catheter secured in bowel with Daniel clamp placed 7 to 8 mm. from sphincter.

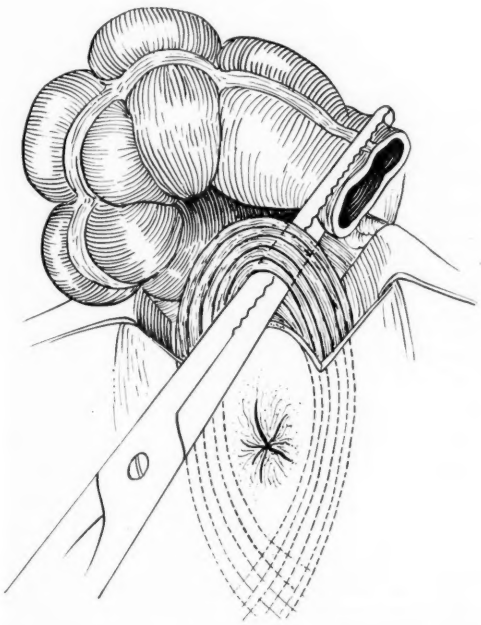


Fig. 2 (Perineal Phase I).—Perineal pull-through. Sigmoid portion of colon is carefully teased through caudal half of external anal sphincter; proximal half encircles outlet of new bladder.

After hemostasis has been secured in

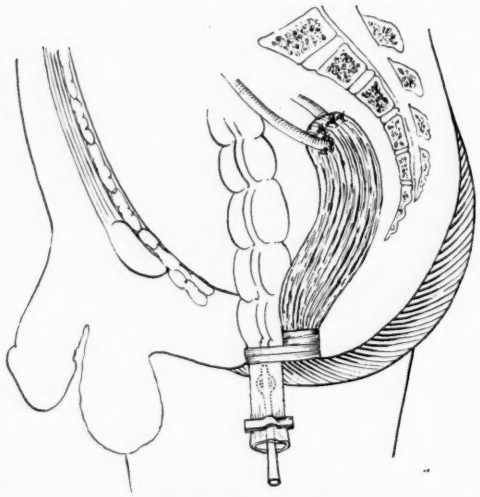


Fig. 4 (Perineal Phase I).—Sagittal section. Sketch demonstrates treatment of external anal sphincter muscle.

the entire area, the peritoneum is next opened and the abdominal contents carefully palpated, particularly the liver in search for metastasis.

First Step of Proctologic Procedure: The proctologist's contribution to this operation commences with the division of the rectosigmoid at its juncture between two large Kocher clamps. The perirectal and pericolic fat is removed from the serosa of both segments of bowel, particularly the rectal stump, in preparation for closure.

Second Step of Urologic Procedure: An open ureteroproctostomy is performed under direct visualization. After thorough cleansing and irrigation of the new urinary bladder with 1 per cent Neomycin solution, points at which both ureters easily reach the rectum are identified, and a small incision, the size of the ureter, is made in a longitudinal plane through the rectal wall on its posterior-lateral aspect. The location should be so chosen that the ureter lies in the sacral curve. Each ureter is transplanted by grasping the previously placed fixation suture and the ureteral catheter and drawing both into the rectal lumen. The catheter is next passed downward toward the anus through a previously placed rectal tube. The mucosa-to-mucosa approximation of the ureter to the rectum is carried out over the catheter with No. 000 atraumatic chromic catgut. The ease with which this can be accomplished is amazing in view of the widely exposed operative area; nevertheless, it should be done cautiously and precisely. Three or four sutures are placed in the adventitia of each ureter and the adjacent rectum, with care not to angulate the ureter.

Second Step of Proctologic Procedure: The proximal portion of the rectum, meas-

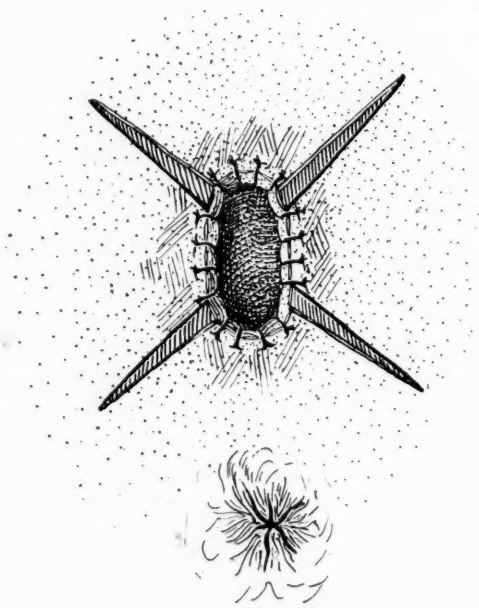


Fig. 5 (Perineal Phase II).—Redundant bowel amputated; remaining bowel sutured to undercut perineal skin flaps (to obviate mucosal prolapse).

uring approximately 13 to 15 cm. from the anal verge, is closed by approximating the mucosa with an inverting type of Connell suture; then Halstad No. 000 sutures of silk are used to approximate the seromuscular layer, with avoidance of the mucosal layer.

The sigmoid colon is mobilized next, in preparation for a perineal "pull-through" procedure, by incising the lateral peritoneal reflection up to the splenic flexure. Next, the inferior mesenteric artery and vein are doubly clamped, transected and ligated, just distal to the point of origin of the left colic artery and vein. In most cases this provides sufficient mobility, granting that a semiredundant sigmoid colon is present, to exteriorize the distal sigmoid colon well beyond the perineum. Particular care is taken to provide adequate vascularity by the marginal artery of Drummond in this procedure. No undue traction can be placed upon the bowel as it is prepared for the new perineal anus.

Perineal Phase: At this point the patient, who is already in stirrups, is elevated to the full lithotomy position, and the perineal surgeon makes a semilunar incision along the anterior and anterior lateral margins of the external anal sphincter. Care is taken to preserve an island of skin approximately 3 to 4 cm. wide between the former anus and the new anterior anal canal. The tissues of the perineum are carefully spread with a hemostat until the prostatic bed is encountered. Further dissection should be accomplished by the blunt finger method. The entire external anal sphincter is exposed around its external periphery to its lateral margins.

The anal sphincter is carefully but forcibly dilated to at least 3 or 4 fingerbreadths. At this point we consider the division of the external anal sphincter an important contribution to the original operation as proposed by Johnson. The external anal sphincter is divided so that its proximal half continues to encircle the former anus, which is now the outlet of the new urinary bladder. The distal or caudal half of the sphincter, that is, the anterior and lateral aspects, is carefully and slowly dilated so that it will surround the "pull-through" colon soon to be introduced into its lumen. Next a large Carmalt hemostat is introduced through the prostatic bed, and the abdominal surgeon introduces the distal sigmoid colon to this clamp. The bowel is carefully threaded through the perineum and through the divided caudal half of the external anal sphincter.

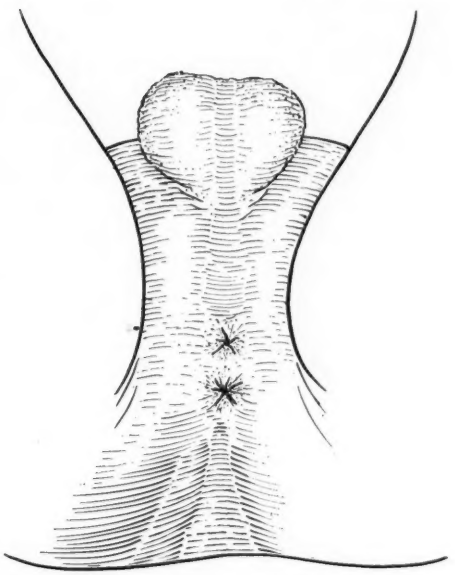


Fig. 6 (Perineal Phase II).—Final postoperative result.

This is perhaps the most important part of the perineal dissection. It must be performed slowly and with considerable caution. If the colon is surrounded by considerable pericolic fat, sufficient to produce marked tension upon the anal sphincter, longitudinal division of the sphincter in its anterior portion must be considered. The

cut ends of the sphincter can be marked with long silk sutures for future recovery. If the tension is great, immediate postoperative strangulation will result. Approximately 6 to 8 cm. of "pulled-through" bowel is exteriorized to compensate and allow for subsequent retraction. A large mushroom catheter is inserted in the "pulled-through" bowel and secured by a Daniel clamp. A petrolatum gauze dressing is applied around the "pulled-through" bowel. The abdominal wound is then closed by the abdominal surgeon, drainage from the space of Retzius being established with no attempt to peritonealize the pelvic floor. A sterile rubber glove is placed over the Daniel clamp, including the rectal tube in the new rectum. The ureteral catheters are secured to the perineal skin just distal to their point of exit from the rectal catheter in the new bladder. Both ureteral catheters and the catheter in the new bladder are connected with sterile plastic tubing to a bottle for drainage of urine.

Early Postoperative Care: The patient should be weighed daily. Fluid and electrolyte balance is maintained by daily intravenous fluids based on daily determinations of the chemical serum pattern. Nasal suction is utilized until bowel activity returns to normal and is then removed. Supplementary parenteral vitamins and antibiotics are mandatory. Fluid intake should be careful, and the output of the ureteral and new vesical catheters must be carefully recorded. Ambulation is usually permitted on the second postoperative day. As soon as possible after the suction has been removed, a soft, low salt diet is ordered, and parenteral medications are discontinued in favor of administration by the oral route. An excretory urogram is taken on the fifth or sixth postoperative day. The ureteral catheters are removed on the seventh day, and the vesical catheter is left in place.

Third Step of Proctologic Procedure (excision of the redundant bowel; revision operation) : Approximately seven to eight days after the operation, depending upon the condition of the patient, he is returned to the operating room and placed under spinal anesthesia in a "jack-knife" position. The redundant bowel is excised over a Payr clamp. Particular care must be taken to free the bowel from the surrounding perineal tissues, and the Payr clamp must be placed at a level corresponding to the cephalad portion of the divided anal sphincter. In case the sphincter muscle has been divided to avoid strangulation of the "pulled-through" bowel, it can be reconstructed at this stage of the procedure. Care at this point will insure against subsequent mucosal prolapse and a bothersome wet anus due to mucosa extending beyond the anterior portion of the anal sphincter. Next, three or four flaps of perineal skin are developed by undercutting; these are sutured with interrupted No. 00 chromic catgut to the mucosa and muscularis of the recently excised bowel. This is done much in the manner of the standard anoplasty for mucosal prolapse of the rectum. Upon its completion, a petrolatum gauze dressing is applied.

Postoperative Care: Hot packs are applied to the anal area for several days and are followed by sitz baths. As soon as the anal edema has subsided, the patient is instructed in the use of sphincter exercises. The new bladder catheter is removed on the ninth postoperative day.

Follow-Up: The patient is discharged with instructions to maintain a low salt diet, supplemented with sodium bicarbonate and an antibiotic or chemotherapeutic agent specific for the organism found by sensitivity tests and culture of the urine from the new bladder.

Residual urine is checked at each office visit, examined microscopically and cultured. The culture is plated, and sensitivity studies are conducted to determine the

medication of choice. Instructions for sphincteric exercises are given. Rectal irrigations are done, and a cathartic is administered.

Serum chemical studies are done monthly; excretory urograms are taken at three, six, nine and twelve months for the first postoperative year and every six months thereafter. A cystoscopic examination with chromorectoscopic study (intravenous indigo carmine) is done in six months, and retrograde rectograms for reflux three months after the operation.

Amphetamine sulfate and decrease in oral fluid intake after late afternoon will control nocturnal enuresis.

REPORT OF CASES

CASE 1—B. R. L. J., a white man aged 36, was admitted to the hospital on Feb. 11, 1958, with a history of sudden onset, one week prior to admission, of gross total painless hematuria, with the passage of one large clot. The patient had had an episode of "flu," and he attributed the possibility of the urinary bleeding to reaction from an acute infectious process. He had noted a similar episode two months prior to admission which lasted, intermittently with the voidings, for two days. He noted no renal pain or discomfort, nocturia, increased frequency or dysuria. He had had meatal stenosis in 1938, treated by meatotomy and dilatation, without symptoms since the operation.

Physical examination revealed the patient to be alert, well developed, well nourished and cooperative. The temperature, pulse rate, respiratory rate and blood pressure were normal. There were no abnormalities of the head, neck, heart, lungs or chest. Examination of the abdomen revealed normal conditions. Normal male genitalia were noted, except for a small scar from the previous meatotomy. The prostate was symmetric, normal in size, shape and consistency and without tenderness or induration, and no suprapubic abnormality was observed. The remainder of the rectal examination revealed no abnormality.

Laboratory Data.—The value for hemoglobin was 15.8 Gm. There were 9,000 leukocytes per cubic millimeter of blood, with a normal differential count. Serologic tests gave negative results. The sedimentation rate was 7 mm. in one hour. The urine was grossly bloody, with a p_H of 5.5, a specific gravity of 1.032, a 2 plus reaction for albumin, negative reactions for sugar and acetone and packed fields of red blood cells on microscopic study. Culture of the urine was sterile.

Roentgen Study.—A thoracic film on admission showed no abnormalities. An excretory urographic series on February 12 showed no abnormalities on the preliminary film prior to the injection of contrast material. After injection of 20 cc. of 30 per cent Urokon, the excretion rate of the contrast material was normal bilaterally, and no abnormalities were noted in either the kidneys or the ureters. Three irregular, overlapping filling defects, 2 to 3 cm. in diameter, were noted in the right hemisphere of the urinary bladder, and the outline of a Foley bag catheter could be seen, deflected to the left of the midline.

Cystoscopic Study.—On February 12, with pentothal, curare, nitrous oxide and oxygen anesthesia, cystoscopic study revealed an external urethral meatus with a small scar from the previous meatotomy. The urethra was otherwise normal. Low grade, chronic, nonspecific prostatitis was noted. The vesical urine was grossly bloody, and several small clots were noted on the floor of the bladder. There was no evidence of intravesical calculus, foreign body or diverticulum. Situated over and obscuring the right ureteral orifice was a soft, friable papillary tumor measuring 1.5 cm. in diameter, implanted on a broad base beyond the orifice and extending up the lateral wall of the bladder to the region of the vesical neck. The tumor was a typical papillary carcinoma with superficial necrosis, sloughing and evidence of recent hemorrhage and was elevated 1.5 cm. from the mucosa. Two discrete papillary tumors, each elevated 1 cm. from the bladder mucosa, measuring 1.5 cm. in diameter and implanted on broad bases, were noted on the roof of the vesical neck, extending into the bladder proper. The left ureteral orifice was normal in size, shape and position, and clear urine appeared from it at regular intervals. Two papillary tumors with narrow stalks, each 3 mm. in diameter, were seen just beyond the left ureteral orifice. Bimanual examination revealed no evidence of extravesical fixation of the bladder in any of the areas described. Transurethral resection of the aforementioned tumors, well into the detrusor muscle and beyond the edges of the bases, was done. The areas were thoroughly fulgurated.

Pathologic Report.—The clinical diagnosis was papillary transitional cell carcinoma,

Grade II, of the urinary bladder. Grossly the tumors were submitted as separated specimens, a total of approximately 5 Gm. of irregular papillary fragments of pale grayish tissue measuring up to 8 to 10 mm. in diameter. Microscopically the specimens revealed highly cellular tumors of the transitional type of epithelium, with marked irregularity of the cells, occasional mitotic figures and invasion of the underlying submucosa. Definite areas of recent hemorrhage and also of necrosis were noted in all sections. Most of the tissue showed a general uniformity of histologic structure. The basal margins of the tumors were well demarcated in most instances, although a few areas showed a definitely infiltrative type of growth into the vesical surface of the detrusor muscle.

Diagnosis.—The diagnosis was papillary transitional cell carcinoma of the urinary bladder, Grade II.

Operative and Postoperative Course.—The patient tolerated the procedure well, and on the fifth postoperative day a repeat cystoscopic study was done. The results at this time were as aforedescribed, except that the tumor areas had been resected and fulguration necrosis was present in all areas. The age and good general physical condition of the patient were considered, and on this basis, combined with a review of the pathologic studies, it was decided that radical cystectomy with diversion of the urine was the procedure of choice. The patient did not wish to have fecal or urinary orifice on the abdominal wall, and a Gersuny type of operation was chosen.

The preoperative blood urea nitrogen was 12 mg. per cent, creatinine 1.6 mg. per cent, CO_2 combining power 25.8 milliequivalents per liter, serum chlorides 94 MEq. per liter, serum sodium 142 MEq. per liter and serum potassium 4.2 MEq. per liter.

A proctoscopic study and an air contrast study of the colon demonstrated no abnormalities.

On February 25 a prostatoseminovesiculocystectomy, with a Gersuny type disposition of the ureters and the colon, was accomplished in eight hours and forty minutes.

Pathologic Report: Grossly, the specimen from the total cystectomy measured 9 by 5 by 5 by 4 cm. The vesical mucosa was shrunken and irregular with multiple areas suggesting tumor infiltrate or recent surgical fulguration. Multiple sections through the wall of the bladder revealed no evidence of infiltration in the muscle wall, and several irregularities in the mucosa were taken for section from the sites of the previous resection. Microscopically, section through the tumor areas showed evidence of recent transurethral resection, with rather heavy fulguration and pronounced necrosis of the tissue. In one area, on the right lateral wall of the urinary bladder, there was infiltration of tumor into, and partial replacement of, a portion of the muscle wall, but only to a depth of 1 mm. and not penetrating through the entire muscle wall of the bladder. The remainder of the sections showed only superficial alteration of the mucosa, with no penetration into the muscle wall. Perivesical and pelvic lymph nodes showed no evidence of neoplasm.

Diagnosis: The diagnosis was papillary transitional cell carcinoma of the urinary bladder, Grade II.

The postoperative course was satisfactory. The second-stage revision operation was done on the ninth postoperative day. The ureteral catheters were removed on the seventh postoperative day and the "rectal bladder" catheter on the tenth. Diurnal urinary control was excellent, and the patient noted a sensation of filling of the rectal bladder, with an urge to urinate at approximately one-hour intervals during the day and every two hours at night. On the fourteenth postoperative day the patient was catheterized for residual urine, and approximately 140 cc. of urine was obtained. An excretory urographic series was done on the fifteenth postoperative day and showed the upper part of the urinary tract to be normal. The patient had some difficulty in controlling the fecal stream initially because of diarrhea, presumably induced by the use of the antibiotics; when this was controlled, however, and at the time of his discharge on the twentieth postoperative day, he noted a normal sensation of filling of the rectum and was able to empty a part of the rectal contents by defecation effort and the remainder by means of a small tapwater enema.

Serum patterns of electrolytes were tested on the second, eleventh and nineteenth postoperative days and were normal in all respects for each series of determinations.

The patient was seen on the twenty-seventh postoperative day. He stated that control of the fecal stream was satisfactory but that control of the urinary stream was not as satisfactory as at the time of discharge, in that he had had occasional nocturnal enuresis. The

amount of residual urine was 45 cc., and moderate pyuria was present. The tidal volume of each voiding was within the normal range, and the pattern of voidings throughout the twenty-four hour period was similar to that observed prior to cystectomy.

Second Admission: The patient was readmitted to the hospital on April 21, after a sudden chill with fever, the temperature reaching 104 F. There was no evidence of renal tenderness at the time. Urinalysis revealed only 12 to 15 white blood cells and an occasional red blood cell per high power field. No abnormalities were detected to account for the fever and chill. An excretory urographic series on April 24 showed excellent bilateral function, with no evidence of stasis or dilatation of the ureters, pelves or renal calyces, and the pyelograms were interpreted as normal.

Third Admission: The patient was admitted again on July 6, at which time an excretory urographic series showed no change from conditions observed at the examination on April 24. The serum electrolyte pattern was normal. Urinalysis showed 88 to 10 white blood cells per high power field. Examination of the rectal pouch with a No. 21 French Brown-Buerger cystoscope revealed a normal anal orifice with normal sphincteric control. There was a tortuosity in the lower third of the rectum or new bladder, consistent with the usual contour of the rectum. The rectal folds were normal except for minimal generalized hyperemia due to the presence of urine. The urine itself was clear, with some excess mucus within the deep mucosal folds. The capacity of the new pouch was approximately 10 ounces. On either side of the proximal midlateral walls of the rectum could be seen two elliptic ureteral orifices, from which clear urine appeared at regular intervals. Chromocystoscopic study with indigo carmine showed vigorous jets of the dye-stained urine emerging from the orifices. A rectographic exposure made after instillation of 10 oz. of 15 per cent Skiodan failed to show any evidence of reflux to the upper part of the tract on the initial filling, and a second, made after an effort at defecation, also showed no evidence of reflux. The serum electrolyte pattern was normal. The patient was discharged on July 8.

The patient has been seen intermittently in the office since that time, and the residual urine has amounted to approximately 10 to 20 cc. at each visit. An occasional erythrocyte, 7 to 12 leukocytes and an occasional clump of bacteria per high power field have been observed. Cultures of the urine have showed an occasional growth of E. coli but otherwise have been sterile. The patient has excellent control of both the urinary and the fecal stream and has returned to his position as an executive in a plastic firm, carrying out his duties without difficulty. He has had normal sexual relations since the fourth postoperative month.

CASE 2.—J. P., a white man aged 44, was admitted to the hospital on May 16, 1957, with the complaint of "coffee-colored urine" noted intermittently of three days' duration two weeks prior to admission. The patient had observed two previous similar episodes, the first occurring six months prior to admission, with a duration of one day, and the second one month prior to admission, lasting for two days. There was a mild increase in frequency of urination during the week prior to admission. No dysuria, nocturia, chills, fever, costovertebral angle tenderness or decrease in the caliber and force of the urinary stream was noted. Bilateral contusion of the testes twenty years prior to admission was the only relevant incident in the genitourinary history. A complete review by systems gave negative results, except for bilateral varicosities of both lower limbs.

Physical examination revealed the patient to be alert, well developed, well nourished and cooperative. The temperature, pulse rate, respiratory rate and blood pressure were normal. No abnormalities of the head, neck, heart, lungs or chest were noted. The abdomen was normal. Normal male genitalia were noted. The prostate was symmetric and of normal size, shape and consistency, without tenderness or induration, and no supraprostatic abnormality was detected. The remainder of the rectal examination revealed no abnormality. Bilateral varicosities of the long saphenous veins were noted, with moderate stasis pigmentation over the anterior aspect of the lower part of the left leg.

Laboratory Data.—The value for hemoglobin was 16 Gm. There were 10,250 leukocytes per cubic millimeter of blood, with 67 per cent polymorphonuclears, 32 per cent lymphocytes and 1 per cent eosinophil. The serologic tests gave negative results. The blood type was ORh-positive. The sedimentation rate was 28 mm. in one hour. The urine was grossly clear amber, with a p_H of 5.5, a specific gravity of 1.018, a 1 plus reaction for albumin, negative reactions for sugar and acetone, and 25 to 30

erythrocytes per high power field. Culture of the urine was sterile.

Roentgen Study.—A thoracic film taken on admission showed no abnormalities. An excretory urographic series on May 16 showed no abnormalities on the preliminary film prior to injection of contrast material. After injection of 22 cc. of 30 per cent Urokon, the rate of excretion of the contrast material was normal bilaterally, with no abnormalities noted in either kidney or ureter. Two well-defined filling defects, each approximately 2 cm. in diameter, were noted in the urinary bladder—one situated in the left inferior lateral aspect and the second in the left lateral aspect.

Cystoscopic examination on May 17 with pentothal, curare, nitrous oxide and oxygen anesthesia, revealed a normal external urethral meatus, distal and proximal urethra and prostatic urethra. The bladder urine was grossly clear, amber. There was no evidence of intravesical calculus, foreign body or diverticulum. There was a considerable amount of edematous reaction close to the urethra and the vesical neck, particularly on the floor on the left side. It was difficult to determine whether this was a simple inflammatory reaction secondary to a tumor process or extension of a tumor. Both ureteral orifices were normal in size, shape and position, and clear urine appeared from each at regular intervals. A large papillary friable tumor mass was situated on the posterior-superior portion of the urinary bladder, to the left of the midline, measuring approximately 3 cm. in diameter. On the mucosa surrounding this area were a number of dilated, tortuous veins. There was a similar friable papillary tumor mass situated on the left wall of the bladder, just beyond the left ureteral orifice, extending up the lateral wall of the bladder to 1 o'clock on the circumference. Both tumors appeared to have broad bases measuring approximately 1 to 1.5 cm. in diameter and were elevated 1 to 1.5 cm. from the mucosal surface. Rectal and bimanual examination did not reveal any evidence of fixation or extension of the growth into or through the bladder wall. Transurethral resection of the tumors into the detrusor muscle and beyond the edges of the bases of the tumors was done, and the areas were thoroughly fulgurated.

Pathologic Report.—A clinical diagnosis of papillary transitional cell carcinoma of the urinary bladder, Grade II, was made. Grossly the specimen consisted of 10 Gm. of irregular papillary fragments, pale, firm and grayish, measuring up to 1 cm. in diameter and 1 cm. thick. Microscopic section showed a highly cellular tumor of transitional epithelium joined in large blunt folds from the surface of the submucosal connective tissues. There was uniformity in most of the histologic structure, although mitotic figures were observed with relative frequency at the base areas. The basal margins of the tumor were well demarcated although in a number of areas there was definite infiltrative growth into the vesical surface of the detrusor muscle.

Diagnosis.—The diagnosis was papillary transitional cell carcinoma of the bladder, Grade II.

Postoperative Course: The patient was operated on and tolerated the procedure well. On the eighth postoperative day, however, pain developed in the right anterior thoracic area, the temperature was elevated, and thrombophlebitis was observed in the left thigh and the lower part of the leg. It was the impression that the patient had a pulmonary embolism, and this was confirmed by roentgen ray. Surgical consultation suggested a bilateral high saphenous ligation on the thirteenth postoperative day. The patient's postoperative course thereafter was uneventful, and he was discharged on the nineteenth postoperative day.

Second Admission: The patient was readmitted on September 4, and on September 6 a recheck cystoscopic study revealed the left ureteral orifice slightly distorted by scar tissue from the previous resection. Just lateral to the left ureteral orifice on the roof of the intraluminal portion of the ureter was a nodule of tissue measuring 2 by 4 by 4 cm., which resembled an area of recurrent carcinoma. The scar from the previous transurethral resection could be seen on the posterior-superior wall of the urinary bladder, and no recurrence was present. The left lateral wall was well scarified except for one edemetous area 3 mm. in diameter, at 3 o'clock, which was suggestive of recurrence. The areas were resected and the bases thoroughly fulgurated. Microscopic study showed irregular masses of transitional epithelium, with considerable pleomorphism and occasional mitosis, with infiltration to the deeper portions of the resected area. Changes were limited to the submucosa and mucosa, without evidence of extension into the detrusor muscle. A diagnosis of transitional cell carcinoma, Grade II, was made, and the operative specimen was similar in all respects to the first sections. The patient's postoperative course

was satisfactory, and he was discharged on the fifth postoperative day.

Third Admission: The patient was readmitted on December 5, and cystoscopic study on December 6 again showed distortion of the left ureteral orifice. There was an irregular well-scarified area in the bladder at the site of the resection on the left lateral wall, with evidence of recurrent tumor. There was a well-healed scar on the posterior-superior wall of the bladder, without recurrence of tumor in this area. Lateral to and beyond the right ureteral orifice was a small papillary tumor measuring 4 mm. in diameter, on a narrow pedicle. This was resected transurethrally and the surrounding tissue fulgurated. Microscopic study showed transitional epithelium with an irregular pattern and mild cellular pleomorphism suggestive of transitional cell carcinoma. No mitotic figures were observed, but in view of the previous history it was regarded as a papillary carcinoma of low grade malignancy (Grade I). The patient was discharged on the sixth postoperative day.

Fourth Admission: He was readmitted on March 16, 1958, for a recheck cystoscopic study. The left ureteral orifice was more contracted and distorted than had been previously noted. Several areas of recurrent papillary carcinoma were seen: (1) an area 3 by 4 mm. in diameter, medial to the right ureteral orifice; (2) an area 3 by 5 mm. in diameter, situated on the roof of the intramural portion of the right ureter; (3) an area 3 by 5 mm. in diameter, anterior and adjacent to the scar on the left lateral wall; (4) an area 4 by 4 min. in diameter, internal to the vesical neck at approximately 1 o'clock; (5) two areas on the posterior-superior wall, adjacent to the cystoscopic bubble, each measuring 6 by 8 mm. in diameter, and (6) an area 10 by 12 mm. in diameter on the roof of the bladder, just internal to the vesical neck, at the 12 o'clock position. Each was resected transurethrally and the base and surrounding area fulgurated. The nodules were submitted separately for examination. The bladder, on bimanual palpation, at this time showed no evidence of induration or fixation to any of the surrounding structures or to the lateral pelvic walls. The microscopic report of the representative sections showed transitional cell carcinoma, Grade II, identical with that observed in the tissue obtained at the first and second resections.

Diagnosis: The diagnosis was papillary transitional cell carcinoma of the urinary bladder, Grade II, with a rare section showing superficial invasion into the detrusor muscle.

The rapidity with which recurrences of carcinoma of the urinary bladder developed in this patient suggested that transurethral resection and fulguration were not sufficient to cure or control the process. The patient's good general physical condition (in spite of a pulmonary embolism) and our inability to cope with the recurrence of the tumors by transurethral means warranted a radical cystectomy with diversion of urine. The patient did not wish to have a fecal or urinary orifice on the abdominal wall, and a Gersuny type of operation was advised. The preoperative hemogram was normal in all respects. The sedimentation rate was 23 mm. in one hour. The values for blood urea nitrogen and creatinine were 16.5 mg. and 1.9 mg. per hundred cubic centimeters, respectively. The carbon dioxide combining power was 21.8 mEq., and the value for serum sodium 140 mEq, per liter. A thoracic roentgenogram and the results of an air contrast study of the color were normal. Proctoscopic study showed mixed hemorrhoids, Grade I. On March 26 a prostatoseminalvesiculocystectomy, and a Gersuny type disposition of the ureters and colon, was accomplished in seven hours and twenty minutes.

Pathologic Report: Grossly the specimen from the total cystectomy measured 13 by 5 by 6.5 by 5 cm. The bladder was opened through the urethra and anterior aspect, with the incision extending over the dome. Exposure of the mucosal surface revealed diffuse edema of the interureteric ridge and the areas of the previous transurethral procedures both old and recent were seen. Microscopic sections of the areas through the resected papillary tumors, as well as random sections in various areas of the mucous membrane, showed no tumor present. There was no neoplastic change in the muscularis of the bladder. Random sections of the vesical mucous membrane showed an unusual morphologic appearance, much more basophilic than is normally observed, and there was general immaturity of the epithelium suggesting generalized dysplasia. There was no extension of the neoplasm beyond the limits of the bladder wall. The perivesical and pelvic lymph nodes showed no neoplasm.

Diagnosis: The diagnosis was papillary transitional cell carcinoma of the urinary bladder, Grade II.

The patient's postoperative course was satisfactory. The revision operation was done one week after the Gersuny procedure. The ureteral and rectal bladder catheters were re-

moved on the tenth postoperative day. Diurnal urinary control was excellent, but enuresis occurred two or three times each night. On the twelfth postoperative day the patient was catheterized for residual urine, and approximately 80 cc. was obtained. An excretory urographic series was also done on the twelfth postoperative day and showed moderate right hydronephrosis and a normal left upper urinary tract. The patient had some difficulty initially in controlling the fecal stream, but it gradually improved and was complete on the day of his discharge, the twenty-fifth postoperative day. Serum patterns of electrolytes were tested on the fifth, tenth and twentieth postoperative days and except for a minimal increase in the blood urea nitrogen level to 21.7 mg. per hundred cubic centimeters on the fifth postoperative day, the serum pattern remained well within normal limits.

The patient was seen on the thirtieth postoperative day. He stated that since he had been at home his control of the fecal stream had been only fair, and that the sensation of defecation and rectal fullness was "not as complete" as just prior to discharge. The urinary stream was in complete control except for an occasional episode of nocturnal enuresis. The tidal volume of each voiding was within normal range, and the pattern of the voidings throughout the twenty-four hours was similar to that existing prior to cystectomy. The residual urine amounted to 15 cc. and mild leukocyturia was present. On the fifty-sixth postoperative day the serum pattern of the electrolytes was normal, the voiding pattern was normal and bowel control was much improved, although with considerable constipation fairly well controlled by small daily rectal irrigations.

Fifth Admission: The patient was readmitted on May 30 for reevaluation, at which time the serum electrolyte pattern was within normal limits. An excretory urographic series on May 31 revealed no abnormalities on the preliminary film, and after injection of the contrast material prompt appearance was noted bilaterally. Both kidneys were normal in architecture. Minimal dilatation of the right ureter was demonstrated, the mild leukocyturia still existed, and 40 cc. of residual urine was present. The patient was discharged on the fourth hospital day.

Sixth Admission: The patient was readmitted on August 28. The residual urine amounted to 40 cc., and there were 10 to 20 leukocytes per high power field. Examination of the rectum with a No. 24 French McCarthy Pan-Endoscope was made and demonstrated a minimal reaction of mucosal hyperemia to the contained urine. The capacity of the rectal pouch was 360 cc. Indigo carmine was given intravenously, and, although neither orifice could be completely visualized, two areas in the proximal-lateral folds of the rectal mucosa were visible, from which indigo carmine appeared promptly and in good concentration. An excretory urographic series showed the upper part of the urinary tract on the left to be normal. On the right there was a pronounced decrease in the dilatation. A rectogram was taken with 300 cc. of 15 per cent Skiodan and failed to show any evidence of reflux on the initial filling, and a second exposure made after an effort to defecate also showed no reflux. The serum electrolyte pattern was normal. The patient was discharged on the third hospital day with a supply of amphetamine sulfate, 10 mg. spansules, in an attempt to control the enuresis.

The patient has been followed since discharge, and a definite improvement has been noted in the nocturnal enuresis as a result of the use of amphetamine sulfate. Mild leukocyturia persists, and the volume of residual urine ranges from 30 to 45 cc. Control of the urinary and fecal streams is excellent. The tidal volumes of urine and the voiding pattern approximate the normal. The patient has returned to his work as manager of an auto body shop and carries out his work as he did before the operation.

COMMENT

In our opinion the Gersuny operation provides the patient with carcinoma of the urinary bladder or other condition in which diversion of urine is required with the following advantages: (1) an average life expectancy and (2) a satisfactory solution to the surgical condition of diversion of urine.

It fulfills the three essential requirements of an ideal diversion of urine by (1) providing correction of the primary pathologic problem or disease; providing the mechanisms for the preservation of normal renal function, and (3) most impor-

tant of all, providing the patient with continence of urine and feces.

This procedure is ideally suited to the male patient, although it can be performed on the female as well. We have had no experience, however, with this.

The rectal reservoir for urine, although initially unsterile, eventually becomes a container of sterile urine, and because of the absorptive qualities of the bowel in this region there should be practically no interference with fluid and electrolyte balance. With potentially sterile urine and practically no absorption from this bowel segment, obstruction to urine flow, as well as pyelonephritis, should be avoided, and the initially normal upper part of the urinary tract should remain so after the operation. The fecal stream has been diverted from the intestinal reservoir, and the problem of increased bowel pressures during defecation, as encountered with ureterosigmoidostomy, is also avoided. The intestinal reservoir for urine can be emptied frequently under voluntary control, and the same situation exists with regard to the intestinal reservoir for fecal material. The orifices are in a "natural" anatomic location and do not require the use of a collecting apparatus. The advantages over cutaneous ureterostomy, ureterosigmoidostomy, an isolated segment of cecum or an isolated segment of ileum are obvious. This operation is but a refinement of diversion to the isolated rectosigmoid, with diversion of the fecal stream by an abdominal colostomy, and eliminates the need of a colostomy.

The three most popular methods of diversion of urine at present are the ileal segment diversion, the isolated rectosigmoid with diversion of the fecal stream by abdominal colostomy and, now, the Gersuny operation. In the first instance the patient and his physician are faced with the problem of incontinence of urine from a stoma in the abdominal wall and collection of the urine by an appliance; in the second, with the use of a colostomy, and in the Gersuny procedure with a perineal colostomy under control and a urinary reservoir also with voluntary control, with both orifices in a "natural" anatomic location. The Gersuny procedure would seem to be the logical procedure of choice for both physician and patient.

The basic principles of ureteral and intestinal surgery must be fulfilled by any method of diversion of urine in order to prevent localized necrosis at the suture line of the anastomosis, leakage, peritonitis, etc. The vascular supply of the ureter must be preserved and during the procedure must not be twisted, traumatized or angulated. The exposure afforded by this method should, with careful technic on the part of the operating surgeon, provide the ideal situation for a ureteral-intestinal anastomosis.

The patient should have voluntary control of the urine almost immediately upon removal of the indwelling catheter from the urinary reservoir. A normal urge to empty the reservoir will occur immediately, as soon as it begins to fill with urine. The capacity of the reservoir will vary, but ideally it should be about 300 cc., with little or no residual urine after emptying. The voiding pattern should approach the normal, and the volume of urine voided approximately the same. Control of the fecal stream requires somewhat longer after the revision operation is done, but should be achieved in approximately two weeks. The new fecal reservoir should be emptied daily, and this is assisted by a small daily irrigation. A normal urge toward bowel movement will develop, but initially some difficulty with the control of flatus will be encountered. This also becomes controlled with time.

As in all radical pelvic operations on the male, impotence is a problem, particularly after cystectomy. In 1 of the cases

noted there was no problem with regard to this.

Initially, the urine cell count will be very high, but as the bowel becomes adjusted to contact with urine and the bacterial density lessens the urine becomes sterile, with the aid of antibiotics and other chemotherapeutic agents.

There is no question that some electrolyte absorption does occur from the isolated rectal bladder (Boyce[8]), but normal or nearly normal function should offset this reabsorption.

Excretory urographic series will demonstrate normality in the upper part of the urinary tract in a patient whose urinary tract was normal prior to operation and an improvement in one whose urinary tract was preoperatively dilated. Roentgenographically, the rectal bladder may assume a rather bizarre shape when filled with contrast material, and an estimate of the amount of residual urine in the reservoir can be made by taking oblique cystograms of the contrast-filled pouch before and after the patient has voided.

Rectograms taken with an inlying catheter in the rectal bladder and injection of the amount of contrast material estimated to equal the capacity of the reservoir can be easily accomplished, and a retrograde reflux rectogram taken shortly after injection and again after removal of the tube and after the patient has emptied the new rectum, will demonstrate ureterorenal reflux if reflux is present.

Cystoscopic examination of the isolated rectum can be easily accomplished as an office procedure, with no discomfort to the patient, and the ureteral orifice can be visualized chromocystoscopically after injection of indigo carmine.

Early diagnosis and subsequent early operation by this method on selected patients with vesical carcinoma or other surgical conditions of the bladder, should provide the patient with a situation that is economically and socially feasible for comfortable survival. This method should encourage more radical procedures in an earlier stage of the disease, with a more satisfactory end result than other methods of diverting the urine can offer.

RÉSUMÉ

Deux cas de carcinome de la vessie chez des hommes relativement jeunes, traités par l'opération de Gersuny avec une modification de la technique, sont présentés.

Les principes de la dérivation urinaire ainsi que ses bases sont examinés par rapport au procédé décrit.

La technique appliquée dans les deux cas est exposée dans ses détails, comme le sont les étapes successives du traitement postopératoire.

ZUSAMMENFASSUNG

Es wird über zwei Fälle von Harnblasenkrebs bei verhältnismässig jungen Männern berichtet, die mit einer Modifizierung der proktologisch-chirurgischen Technik nach Gersuny operiert wurden.

Es wird ein Überblick über die Grundsätze der Harnableitung und über ihren geschichtlichen Hintergrund gegeben mit besonderer Berücksichtigung des beschriebenen chirurgischen Vorganges.

Die in diesen beiden Fällen angewandte Technik sowie die unmittelbaren und endgültigen postoperativen Massnahmen werden in ihren Einzelheiten beschrieben.

RESUMEN

Se presentan en este trabajo dos casos de carcinoma de la vejiga urinaria en sujetos jovenes tratados por la operación de Gersuny con una modificación de la técnica quirúrgica proctológica.

Se describen los principios de la diversión urinaria y sus fundamentos histórі-

cos con referencia particular para el procedimiento.

Se expone con detalle la técnica seguida en los dos casos así como las diferentes fases del postoperatorio.

RIASSUNTO

Vengono presentati due casi di carcinoma della vescica urinaria insorti in individui relativamente giovani e trattati chirurgicamente con l'intervento di Gersuny modificato.

Viene fatta una rassegna sui metodi di derivazione dell'urina con particolar riguardo al metodo impiegato.

Viene descritta dettagliatamente la tecnica operatoria e le norme per il trattamento pre- e post-operatorio immediato.

REFERENCES

1. Gersuny, R.: Cited by Foges, P.: Proc. K. k. Gesellschaft der Arzte in Wien, Wien. klin. Wchnschr. **11**:990, 1898; Zntrlbl. f. Chir. **26**:497, 1899.

2. (a) Johnson, I. H.: Further Experiences with a New Operation for Urinary Diversion, J. Urol. **76**:380-386, 1956. (b) Lowsley, O. S.; Johnson, T. H., and Rueda, A. E.: A New Operation for Diversion of the Urine with Voluntary Control of Feces and Urine; Preliminary Report, J. Internat. Coll. Surgeons **20**:457, 1953. (c) Lowsley, O. S., and Johnson, T. H.: A New Operation for Creation of an Artificial Bladder with Voluntary Control of Urine and Feces, J. Urol. **73**:83, 1955.

3. Hinman, F., and Weyrauch, H. M. Jr.: A Clinical Study of Different Principles of Surgery Which Have Been in Ureterointestinal Implantation, Tr. Am. A. Genito-Urin. Surgeons **29**:15-156, 1936.

4. Bricker, E.: Substitution for Urinary Bladder by Use of Isolated Ileal Segments, S. Clin. North America **36**:117-1130, 1956.

5. Merricks, J. W.; Gilchrist, R. K.; Hamlin, H., and Rieger, I. T.: Substitute Bladder and Urethra, Using Cecum as Bladder and Ileum as Urethra, J. Urol. **65**:581-584 (April) 1951.

6. (a) Poth, E. J.: Intestinal Antisepsis in Surgery, J.A.M.A. **153**:1516, 1953. (b) Scott, W. W.: Urologic and Physiologic Aspects of Uretral Transplantation, Am. J. Obst. & Gynec. **68**:1301, 1954. (c) Skanse, B., and Widen, T.: Potassium Deficiency Syndrome Following Bilateral Ureterosigmoidostomy, J. Urol. **73**:62-66, 1955. (d) Smith, G. I., and Hinman, F. Jr.: The Rectal Bladder; Colostomy with Ureterosigmoidostomy; Experimental and Clinical Aspects, J. Urol. **74**:3-354, 1955.

7. Kiefer, J. H., and Lienke, C.: Ureterorectostomy and Pre-Anal Colostomy for Bladder Exstrophy, J. Urol. **79**:242, 1958.

8. Boyce, W. H.: Reabsorption of Certain Constituents of Urine from the Large Bowel of the Experimental Animal, J. Urol. **65**:241, 1951. Boyce, W. H., and Best, S. A.: The Role of Ammonia Reabsorption and Acid-Base Imbalance Following Ureterosigmoidostomy, J. Urol. **67**:169, 1952.

9. Mauclaire: Ann. d. mal. d. org. genito-urin. **13**:1080, 1895.

10. Kinman, F. M.; Sauer, D.; Houston, B. T., and Melik, W. F.: Substitution of the Excluded Rectosigmoid Colon for the Urinary Bladder, Arch. Surg., **66**:531, 1952.

11. Creevy, C. D.: Some Observations Upon Absorption After Ureterosigmoidostomy, J. Urol. **70**:196-202, 1953.

12. Maydl, K. J.: Ueber die Radiokoltherapie der Ectopia Vesicae Urinariae, Wien. med. Wchnschr. **44**:1169, 1209, 1256, and 1297, 1894.

13. Stonington, O. G., and Eisman, B.: Perineal Sigmoidostomy in Cases of Total Cystectomy, J. Urol. **76**:74, 1956.

Every man can be seen as a fraction, whose numerator is his actual qualities and its denominator his opinion of himself. The greater the denominator the less is the absolute quantity of the fraction.

—*Panin*

Surgical Correction of Stress Incontinence: Methods and Technics

VIRGIL S. COUNSELLER, M.D., F.A.C.S., F.I.C.S. (Hon.), D.A.B.

PHOENIX, ARIZONA

THIS subject is always an important one for general discussion before any surgical group or specialty who are interested in this entity. The etiologic, physiologic and surgical anatomic aspects have been well described in recent literature by authorities throughout the United States.

The subject matter that merits repetition, in my opinion, is diagnosis and the problems involved therein, the selection of methods of repair, and the advantages and disadvantages of different operations, some of which deserve emphasis.

One of the real problems is to determine the amount of stress incontinence and whether it is associated with any other pelvic symptoms, such as those observed with cystocele, prolapse and rectocele; also, whether there have been previous attempts at surgical correction. I reviewed this subject eight years ago, and presented data on 578 patients surgically treated for stress incontinence.[1] In general, it was concluded that 85 per cent of the patients would be cured of their incontinence by a simple plastic procedure such as the Kelley or the Kennedy operation, and also, that if these operations were employed after previous surgical repairs had failed, the subsequent rate of cure was only about 57 per cent.

The reasons for the incontinence, therefore, must be clearly understood and carefully demonstrated before repair is attempted. Most surgeons are convinced that there is some funneling and descent of the vesical neck and the posterior portion of the urethra, with loss of the posterior urethrovesical angle. In addition to these factors, Youssef has shown that the real crux is decompensation of the internal vesical sphincter and the posterior portion of the urethra. One must remember that there is a slight normal displacement of the bladder downward and backward, which I regard as responsible for micturition mobility. Whatever overexaggerates this position, by relaxation of the pelvic floor, or any trauma that produces fixation of the urethra or the vesical neck (obstetric deliveries or operations) to such a degree as will hold open the internal urethral orifice will result in incontinence. All operations of whatever type, vaginal, suprapubic or a combination of these, must be executed in a fashion that will restore normal mobility, sphincter tone and the posterior urethrovesical angle.

Ball[2] has simplified surgical thinking by dividing the cases of incontinence into four stages. He then states his indications and the type of surgical intervention applicable to each stage. For instance, in Stage 0 he

Read at the Twenty-Fourth Annual Congress of the North American Federation, International College of Surgeons, Chicago, Sept. 13-17, 1959.

Submitted for publication March 15, 1960.

The principal reason for stress incontinence are mentioned. Ball's classification is reviewed. Some effective surgical procedures are discussed and attention is called to their several advantages and disadvantages.

places those patients who are potential candidates for incontinence. The patient who has undergone a vaginal hysterectomy for prolapse and who did not have incontinence preoperatively may have it postoperatively. Patients subjected to laparotomy for pelvic disease or other lower abdominal conditions with medical factors known to aggravate poor bladder control, but the necks of whose bladders have not as yet decompensated, may be spared operation later by a simple prophylactic plication from the abdominal route at the same time.

In Stage 1 he groups those patients who have minimum relaxation of the anterior wall with intact pubococcygeal function. The latter is inadequate, so some funneling will be viewed by urethroscope. A lateral roentgenogram with the patients standing will confirm this, as well as the obliteration of the posterior urethrovesical angle. It will reveal, too, the abnormal mobility on straining. For these patients he recommends a partial vaginal vesicouretholysis and plication.

The patients in Stage 2 are basically the same as in Stage 1, except that there are aggravating medical factors, such as asthma and persistent cough. The degree of incontinence is likewise greater. The urethrogram will demonstrate abnormal mobility and loss of the normal urethrovesical configuration. Ball recommends, and I agree, that in such instances a combined vaginal and suprapubic operation is required for cure. Furthermore, it is usually in such cases that vaginal plication alone is a failure, so it would be logical to do the combined operation in the first place, to eliminate the need of a subsequent operation for the same malady at a later date.

Patients in Stage 3 usually have undergone previous attempts at repair and are "operative failures." The failure is due to the fixation, distortion and adhesions of the urethra and the vesical neck. A case in point is one in which the surgeon successfully closes a vesicovaginal or urethrovaginal fistula but leaves the patient with a loss of urinary control. This situation requires the complete separation of the pelvic diaphragm, to mobilize the urethra and the neck of the bladder entirely. The repair must consist of an extensive plication vaginally and abdominally, plus cystopexy.

It becomes quite obvious, it seems to me, that by and large these patients require one thing from surgical treatment, which is restoration of the posterior urethrovesical angle, the sphincter tone and normal mobility of these parts. This can be done in many cases of mild incontinence by a vaginal urethrolysis and plication. In cases of more severe involvement, with respiratory difficulties and operative failure, repair is best done by the combined operation.

Among the suprapubic operations that have been described there are two that seem to me particularly applicable, simple to perform and attended with a high incidence of cure. I refer to the Marshall-Marchetti-Krantz operation and the Ball operation.[3] These two operations are so effective that it is rarely necessary to resort to the more difficult strap or fascial sling procedures. The former of these two operations was given much publicity, with descriptions and citations of good statistics. Consequently I fear it has been done in some instances in which one of the simpler vaginal urethrovesicolysis and plication technics would have cured the patient. There have been reports of complications, such as osteitis pubis, fistulas and recurrence. A secondary operation for recurrence after this operation is not an easy task.

Sling operations must not be discarded, and one should be familiar with the different methods of making a sling for the

urethra and the vesical neck. I have concluded that about the only time one should resort to one of these operations is when there is a congenitally short urethra, a defective trigone and a congenitally absent kidney. In this situation there is no funneling and no descent of the vesical neck, but there is decompensation of the internal urethral sphincter and the posterior portion of the urethra. The only way to elevate these structures and to lengthen the urethra safely is by a fascial sling. I prefer the Millin-Read type, since it has been more effective in my hands. Considerable experience is necessary to execute these sling operations safely, so that one will have the right amount of tension on the urethra. If the tension is on the strong side, there will be retention of urine or inability to urinate at all. Here, then, repeated urethral dilatations are required. Occasionally the sling must be partially divided. One of my former associates made this comment in one of our joint communications: "We find it less difficult to manage the patient who continues to have 'leaking trouble' (stress incontinence) than the one who continues to have 'trouble leaking' (retention) in the postoperative period."

One must expect complications from any suprapubic operation. There will be more after a secondary operation. These are thrombophlebitis, retention, obstruction, hemorrhage requiring transfusion, osteitis pubis, perforation of the bladder and occasional slough of the posterior portion of the urethra. These will be reduced to a minimum with careful urethral dissection and mobilization, the sutures to be inserted with meticulous care.

ZUSAMMENFASSUNG

Die wesentlichen Gründe für Belastungsinkontinenz werden erwähnt. Die Ballsche Klassifizierung wird besprochen. Einige wirksame chirurgische Massnahmen werden unter Hervorhebung mancher ihrer Vorzüge und Nachteile erörtert.

RÉSUMÉ

Les causes principales de l'incontinence par stress sont mentionnées. La classification de Ball est passée en revue. Certaines techniques chirurgicales efficaces sont discutées et l'auteur attire l'attention sur plusieurs de leurs avantages et inconvénients.

RIASSUNTO

Vengono ricordate le cause principali dell'incontinenza e viene riesaminata la classificazione di Ball. Vengono, poi, discussi alcuni fra i più efficaci metodi per il trattamento chirurgico con i rispettivi vantaggi e svantaggi.

RESUMEN

Se mencionan en este trabajo los principales casos de mición imperiosa. Se estudia la classificación de Ball. Se comentan algunos procedimientos quirúrgicos y se subrayan los pros y los contras.

REFERENCES

1. Counseller, V. S.: J.A.M.A. 146:37. 1951.
2. Ball, T. L.: Gynecology, Surgery and Urology. St. Louis: The C. V. Mosby Company, 1957.
3. Marshall, V. F.; Marchetti, A. A., and Krantz, K. E.: Surg., Gynec. & Obst. 88:509, 1949.
4. Millin, T., and Read, C. D.: Postgrad. M. J. 24:3, 51, 1948.

Decompression: A New Aid in the Second and Third Stages of Labor

O. S. HEYNS, M.A., D.Sc., F.R.C.O.G., F.I.C.S.,
W. A. B. ROBERTS, M.B., B.Ch., D.O. and G. (South Africa)
AND
H. G. SMULIAN, M.B., B.Ch., D.O. and G. (Rand)
JOHANNESBURG, SOUTH AFRICA

The authors describe the equipment and technic employed in applying suction as an aid in delivery and explain the mechanisms involved. In their experience, decompression of the outlet facilitates birth without bearing down or manual pressure. Less work within the birth canal during expulsion is required, since with decompression the other pelvic viscera contribute to the forcing open of the pelvic diaphragm. The results in the first 30 cases in which decompression was employed are tabulated.

CONSIDERATION of abdominal decompression during the first stage of labor will be found elsewhere.* When trials of the effect of a partial vacuum around the abdomen were being made successfully, the possibility of applying suction during expulsion of the fetus arose. The purpose of the present paper is to describe the apparatus and method used for suction during the second, and particularly the third stage of labor; to present the clinical results obtained, and finally, with the support of experimental observations, to offer an explanation of the mechanism at work. In order to effect suction, a seal must be secured around the exterior of the pelvic outlet.

Apparatus and Method.—The first trial was made by having the parturient sit on the circular rubber-bonded vent of a decompression chamber constructed for admitting the pregnant abdomen in an upright position. It had been observed that a cushion of soft tissue around the pelvic outlet was available to afford a seal when the thighs were held together. The abdominal chamber referred to was about 8 gallons in volume and was housed upon a tilting table. With the table in the horizontal position it was easy to sit with bare skin and legs adducted on the vent and to apply suction to the chamber. An effective seal was readily obtained, and pressure readings of 100 to 150 mm. of mercury below the atmospheric were obtained. The

From the University of the Witwatersrand, South Africa. Submitted for publication April 26, 1960.

*Heyns, O. S.: South African J. Med. Sci. 23:157-166, 1958; Med. Proc. Johannesburg 5:121-135, 1959; ibid. (editorial) 5:117-119, 1959; J. Obst. & Gynaec. Brit. Empire 66:220-228, 1959; Lancet (editorial) 2:91-92, 1959.

rubber surface was plane, and a good seal was secured only when the bare skin was applied. Even thin silk panties impaired the seal.

A large aluminium pot was then purchased and a kidney-shaped piece, with axes measuring 9 by 7 inches (22.8 by 17.7 cm.), cut out of the lid. The lower surface was bonded with sponge rubber 1 inch thick so as to provide an air seal between the rim of the bucket and the lid. The whole of the upper surface was bonded with a flat layer of sponge rubber 1 inch (2.5 cm.) thick. It is on this plane surface of rubber that the parturient sits.

The chamber was mounted on a low wooden stand to raise it to a convenient height for comfortable sitting. A brass nipple for fitting rubber tubing was screwed into the side of the chamber, and a viewing window and a small internal electric lamp were added. The suction pump used was the Edwards RB4, which is a roughing pump with a capacity of 70 litres per minute.

The equipment thus consisted of a chamber with a loose lid, incorporating the requisite rubber for sealing purposes, a suction pump and rubber tubing.

The policy for the third stage was to apply suction after separation of the placenta. No delay was involved except in complicated cases, when it was known that there was an adherent or unseparated placenta. There was no need to touch the abdomen, but as soon as the signs of placental separation were present, the parturient got up and sat on the bucket. Getting right out of bed at this stage of labor is objectionable, and a high wooden stand was improvised to allow the patient to sit at such a height that her feet rested on the bed instead of the floor.

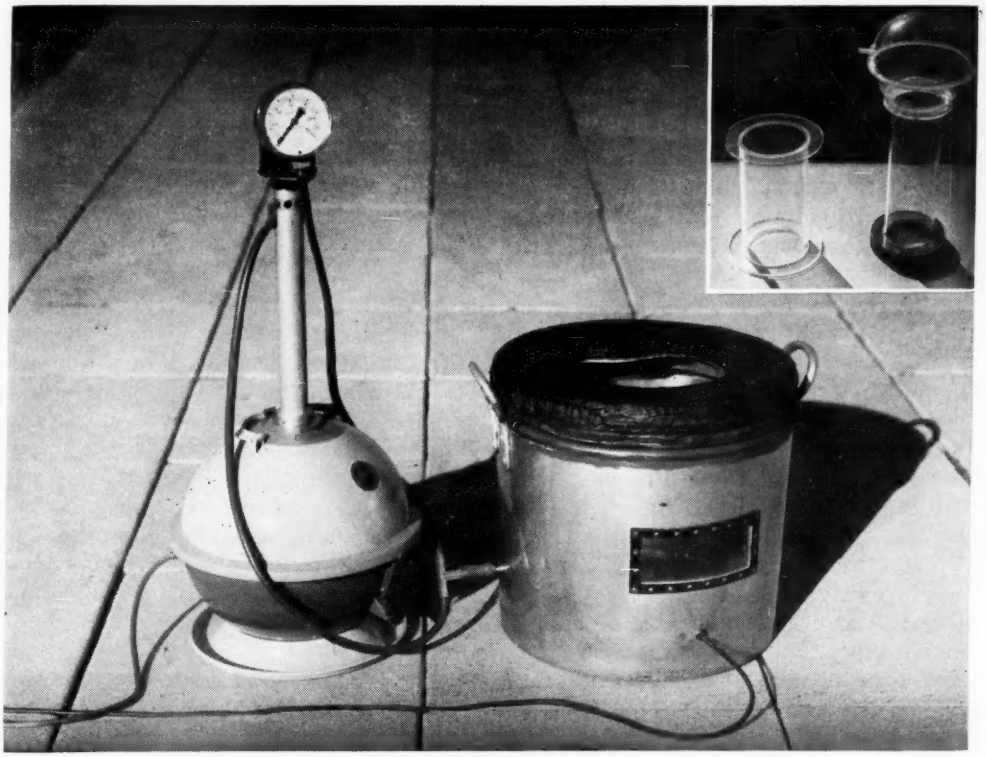
A seal was readily obtained if the patient sat well back or erect, but it is possible to have some difficulty in effecting a partial vacuum in the chamber. It was found necessary to drop the pressure by 100 to 150 mm. of mercury and to employ this level of decompression in short bursts, each lasting about five seconds at peak pressure. Characteristically, a separated placenta dropped into the bucket in twenty to thirty seconds.

In recent clinical and other trials a perspex cylinder as shown in the accompanying illustration (inset) was used. It was perfectly mobile, in the sense that it could be applied to the perineum with the patient in the dorsal position and the thighs flexed and abducted. Thus the cylinder could be brought to the patient wherever she was.

Clinical Results.—The most striking observation was that expulsion of the placenta occurred in the majority of cases within a few seconds of the beginning of decompression. The impression gained was that the placenta had been forcibly impelled through the vagina. In each case the cord was clamped with artery forceps, which rested on the floor of the chamber, and in some cases the cord could be seen uncoiling out of the vagina as soon as decompression was applied and just prior to expulsion of the placenta.

The second phenomenon observed was the postpartum hardness of the uterus. This was present in all but one complicated case. Palpated through the abdominal wall, the uterus could be encompassed in the hand and felt harder than anything previously observed post partum: it felt like a cricket ball, though a little larger, and gave the impression of being stony hard.

Corresponding with the consistency of the uterus, there was a conspicuous lack of bleeding. There was one exception to this, in which a patient with other complications lost 40 ounces of blood one hour after delivery. The uterus was always firmly contracted post partum, and there was no tendency to bleed. There is every indication that, postpartum, ergometrine is un-



Decompression of the pelvic outlet. Bucket prototype used in early cases (series of 30) with Hoover suction pump as used at present. *Inset*, original mobile cylinder for outlet decompression.

necessary, although in the original series ergot was withheld in only 4 cases in which personal observation was possible.

With a view to publishing our observations, we have repeated the clinical work first done a few years ago. The early observations on both second and third stages have been confirmed.

The accompanying table contains the relevant details of each of the first 30 cases in which decompression was employed. All have been included in order that others may profit from our experience.

Mechanism of Outlet Decompression.—When decompression was first applied to the outlet, it was questionable how far into the soft tissues the partial vacuum would extend. It seemed certain that the limit would be the floor of the abdomen, which incorporates the levatores ani. Pressure in the abdominal cavity would be at least atmospheric, as under normal conditions.

The experiment gave the following results: An obturator fashioned from paraffin was inserted into the vagina and was expelled by decompression. If uncomfortably large, the obturator was not readily expelled. A Fergusson speculum placed in the vagina and held in place firmly by adhesive tape around the vulva was ejected with what seemed to be considerable force. Decompression in the second stage was attempted next, and there was material evidence that a pressure head was at work. When a high fetal head in a small partu-

rient aged 15 descended quickly with suction and the child was born with unexpected ease, one was at a loss to explain the mechanism. Finally, the application of decompression in the third stage was regularly followed by expulsion of the placenta. This and the unusual firmness of the postpartum uterus were explained tentatively by various mechanisms, but without confidence.

Matters were further complicated when it was observed that vaginal pressures remained positive during decompression of the outlet. It was only just inside the introitus that pressures corresponded with those in the chamber. Moreover, the wax obturators were not expelled when inserted well into the vagina, i.e., right up at the vault.

In the present attempt at explanation, the following morphologic basis is employed: The levator is inserted around the vagina very low, on average at the juncture of the third and lowest quarters of the vagina. The levator is just as mobile as the perineal skin covering the bony outlet. It is, in fact, virtually tacked down onto it at the central point of the perineum and along the anococcygeal raphe. In the angle between the two lies the ischiorectal fossa with its fascia lunata and compressible pad of fat. In so far as the perineal surface moves downward about 2¾ inches (6.7 cm.) during the second stage of labor and the vulval cleft and its posterior extension can move upward from the midposition of erect posture for more than 2 inches (5 cm.), the mobility of the pelvic diaphragm is remarkable and must of necessity correspond with the range of movement of the integument. At rest the pressure in the abdominal cavity is a few millimeters of mercury above the atmospheric: the soft walls are forced in so as to conform to the external pressure, but in addition the postural tone of the musculature makes a small pressure contribution. Abnormal states like standing on one's head cause a negative pressure in the incompressible pelvis, but these do not apply here. When the trunk is erect, however, the pressure in the pelvis is about 35 mm. of mercury above the atmospheric level, owing to the column of mobile viscera supported by the pelvic floor.

Pressure above atmospheric is referred to as positive and that below as negative.

The first question to settle is whether the negative pressure can extend up along the vagina and perhaps into the uterine cavity. This seems unlikely, because most of the vagina lies above the levators in the abdominal cavity and is compressed by the surrounding positive pressure. The more negative the pressure inside the lumen, the more completely will it be obliterated. This view would also explain why all vaginal pressure readings above the levator are positive in the presence of outlet decompression.

In view of the success of decompression in both second and third stages, one wondered whether a pregnant woman with a substantial presenting part in or over the pelvis would be different from the subjects used for the experiments. In considering the firm postpartum uterus, a conclusion was not unnaturally reached that the uterus was exsanguinated. It is not clear on first thought how a negative pressure could develop around the uterine veins for the purpose of sucking out the intramural blood. An alternative mechanism would be the positive abdominal pressure on the outside of a uterus of which the cavity has been decompressed by some 2 pounds (0.9 Kg.) per square inch. The objection to this was the fact that the vaginal pressure readings during the experiment were never negative. F. S. Crafford, the author, pointed out that this should cause severe hemorrhage, and we have since demonstrated the correctness of this contention.

*Data on First 30 Cases of Delivery with Decompression**

Case	Parity	Age	Time Before Use of Decompression Chamber, Min.	Time on Decompression Chamber, Min.	Total Duration of 3d Stage, Min.	Blood Loss Before Use of Decompression Chamber, Oz.	Blood Loss During & After Use of Decompression Chamber, Oz.	Total Blood Loss, Oz.	Comment
1	4	30	4	3	12	—	12	—	Decompression had no effect—50 to 70 mm. Hg. only
2	0	16	2	1	3	—	12	12	Edema of labia minora
3	0	19	3	1	4	—	2	2	Admitted with retained twin
4	0	19	2	1½	6	—	6	6	Decompression 1½ min. only (bad airseal)
5	0	16	7	—	—	—	—	—	Placenta fell into chamber immediately, before decompression was started
6	0	35	120	—	—	—	—	—	Several minutes on chamber; no result constriction ring present which required deep anesthesia and amyl nitrite
7	1	18	6	½	6½	9	6	15	9 oz. loss before use of decompression chamber
8	0	20	10	½	10½	2	4	6	
9	0	22	10	2	12	2	8	10	
10	0	21	20	10	40	4	10	14	Placenta removed by Crede's maneuver
11	5	27	5	½	5½	14	2	16	14 oz. loss before use of decompression chamber (1 min.)
12	1	23	5	½	5½	4	3	7	Piece of membrane removed from introitus; ergot not used
13	2	32	2	½	2½	—	8	8	Ergot not used
14	6	33	3	5	8	4	35	39	History of previous postpartum hemorrhage
15	5	35	10	4	14	8	3	11	Ergot not used; history of postpartum hemorrhage
16	0	—	3	2	5	3	8	11	Ergot not used
17	0	—	5	2	7	2	4	6	
18	1	24	19	1	20	3	2	5	
19	0	18	3	1	4	3	10	13	
20	3	25	3	½	3½	1	2	3	
21	1	23	2	½	2½	—	16	16	N.B. 16 oz. in 2½ min.
22	0	21	10	1	11	7	2	9	
23	1	20	4	1	5	1	2	3	
24	6	33	(5 (4	10½)	20	—	2	2	Twin pregnancy; partial Brandt Andrew's
25	0	18	4	10	14	—	14	14	Obvious delay in separation of placenta
26	6	38	2	8	10	4	30	34	40 oz. lost 1 hour after delivery. Unequivocal diagnosis of concealed accidental hemorrhage had been made
27	2	24	5	1	6	—	2	2	
28	3	27	5	1	6	—	2	2	Antepartum hemorrhage during pregnancy
29	0	22	3	1	4	1	4	5	
30	1	25	3	7	10	2	14	16	Marked vulval hematomas

*Cases 1, 5 and 6 should be omitted from the analysis. In Cases 2, 10, 14, 24, 26 and 30 there were complications after decompression. In the remaining 21 cases the treatment was successful. The patient in Case 3 was admitted with a retained twin; in Case 28 antepartum hemorrhage had occurred during pregnancy, and in Case 15 postpartum hemorrhage had occurred in previous labors.

The only solution that can be offered is this: A normal presenting part, but also the third stage uterus, is of such a bulk that the pelvic brim is sufficiently blocked to prevent viscera passing from abdomen to pelvis minor. The smallest structure available for such transfer would be colonic contents, a loop of intestine or the omentum. Pressure changes in fluid contained in a vessel are transmitted freely so as to retain a uniform pressure, but in the peritoneal cavity the fluid elements are contained in relatively massive units, like loops of intestine, which cannot pass through the correspondingly narrow gaps and slits remaining between the pelvic brim and a bulky uterus forced down upon it. What is visualized, therefore, is that decompression, acting through the nonrigid pelvic floor, causes a drop in pelvic pressure, for the pelvic basin is now isolated from the abdomen proper. Whereas the abdomen has compressible walls, the pelvic walls are rigid. If by a progressive drop in pressure the levator is forced downward because of a difference in pressure between its superior and inferior surfaces, a transient increase in volume would result and cause a partial vacuum. The brim is obstructed by the uterus and its bulky contents, but no other viscera enter the true pelvis. (The intestine has to be compressed so tight as to cause an insuperable obstruction.) Thus a low pressure region exists in the inferior part of the pelvis above the levator level. It is accordingly clear how a fetal head above the brim, particularly in the presence of disproportion, maintains a negative pressure in the pelvis below it. Positive pressure in the abdomen above and negative pressure in the pelvis below the head cause it to be given momentum. At the same time, the aperture in the pelvic floor (levator gap) is forced open by decompression and offers less resistance, which in effect means that the levator is partly pushed out of the way.

These conditions affect the other situations similarly; thus, the placenta is expelled because there is a negative pressure in the region superior to the levators; the uterus is exsanguinated because there is high pressure around the upper segment and low pressure around the lower externally, and blood is squeezed above and finds its way along the paths of least resistance. Conversely, the positive vaginal pressures occur in the nonpregnant because there is no means of blocking the pelvic brim, with the result that any change of pressure on one compressible abdominal wall (levator) is met by an opposite change elsewhere in order to keep the volume unchanged and the pressure uniform. Finally, in the case of the vaginal obturators, expulsion is possible only when a portion of the mass projects through the levator gap; when it lies entirely above the levator, there is no pressure gradient to drive it out. When its size is excessive, the force that can be derived from its relation to the levator gap may be insufficient to expel it.

Second Stage.—There is no doubt that decompression has some effect in the second stage of labor. While speed and violence in the passage of the fetal head through the lower birth canal is to be avoided, the more obvious effects of suction are as follows:

1. The difference in pressure provides a force that can replace the secondary powers. If the parturient bears down as well, descent of the head will take less time. She need not bear down, however, and will accordingly save energy.

2. The uterus does not have to work, because decompression can be employed even between contractions. Normally both primary (uterine) and secondary (bearing down) powers are required for expulsion of the fetus, the former to seal off the suprauterine compartment of the abdomen and the latter to create the pressure head.

Decompression can yield even more pressure gradient than is normally required and will complete the second stage without uterine action if desired. This may prevent "exhaustion" (fatigue) in certain complicated cases, and so postpartum hemorrhage.

3. The resistance of the pelvic floor is reduced by a pressure of the order of 100 mm. of mercury (2 lb. per square inch); the fetal head, therefore, is used less as a battering ram than in normal labor. Our calculations show that a force of under 8 pounds (3.6 Kg.) is required, instead of about 22 pounds (10 Kg.).

A structural effect produced by the pressure head is to open the pelvic floor aperture more widely and consequently to pull it lower. In this connection it is significant that in the normal expulsive stage the fetal trunk is used for the transmission of axial pressure. Thus, in so far as nothing but the fetus is used as a battering ram, its head takes the full force. On the other hand, with decompression the other pelvic viscera and their initial high pressure contribute as well toward the forcing down of the pelvic diaphragm. For this reason there is a modicum of work not required to be done in the birth canal itself.

Conclusion.—One may say that decompression in the second stage is much like forceps extraction, the difference being in its favor and based on a reduction of resistance or friction to the fetal head: (a) less work has to be done in the birth canal itself, and (b) contractions not being necessary, placental circulation is not interfered with. Thus this fetal hazard is absent.

Note: Looking toward the ideal, one is struck by the fact that there is no lack of energy. Whereas the sources are (a) primary and secondary powers and (b) the pressure potential of decompression, the first two do not even have to be called into service when suction is employed. The art here would be to drive the head through the pelvis in the shortest possible time, using the smallest force required for the purpose. The advantage that is being exploited, however, is the total omission of interference with the placental circulation.

Experimental Observations.—

1. Vaginal pressure readings in the third stage were made, a Statham head and galvanometer being used. At the termination of the second stage decompression was started, the cylinder being applied to the patient lying in the dorsal position. The results were as follows: a. Pressures were negative and followed the chamber pressure with a difference of about 60 mm. of mercury. b. With the descent of the placenta into the lower part of the vagina, the pressure rose to the atmospheric level. c. Expulsion of the placenta was followed by a return to negative pressure.

2. Vaginal pressures were measured as aforedescribed in the cases of women near term with the fetal head above the brim, engaging and engaged in the pelvic cavity. Pressures remained unchanged (i.e., 3 to 4 mm. of mercury) with decompression except when the head obviously fitted tightly in the brim or lower part of the pelvis.

3. In the second stage of labor the effect of decompression was best seen when there was a tight fit of the fetal head in the pelvic brim. In a few cases of disproportion, descent, and even birth, were dramatic. When decompression failed to effect expulsion of a head that was in the pelvis, it was our impression that the head was too tightly impacted to be moved by the pressure gradient employed. It seems likely, however, that the vaginal pressures may not have been negative in this case. On the other hand, a small fetus has been sucked right into the decompression cylinder (see inset in accompanying illustration). In our opinion, crowning of the head is intimately connected with passage through the levator gap. At this stage it

seems that decompression should give some impetus in all cases.

4. It was a disappointment to find that outlet suction during the fourth stage caused rapid and severe hemorrhage from the placental site. It was noted that vaginal pressure was negative at this time. This corresponds with what we now call the F. S. Crafford mechanism, to which reference has been made. We still hope that closing off the lower part of the vagina by means of an obturator may prevent a drop in pressure during decompression for severe fourth stage hemorrhage; what is presumably required is a negative pelvic pressure outside the uterus. A negative pressure inside must cause the Crafford phenomenon. We are, however, not ready to report on this aspect of the work.

SUMMARY AND CONCLUSIONS

The equipment and method used in making suction around the pelvic outlet are presented. Suction was carried out in the second and third stages of labor. A table of all of the first 30 third-stage cases is included. An explanation of how mechanism of decompression operates is offered. Experimental data correspond with the hypothesis, and in the authors' opinion they substantiate the mechanism aforementioned.

The conclusions to be drawn from the investigation touch both basic and applied considerations. They are as follows:

1. Outlet decompression will deliver the placenta and the fetal head through the pelvis without the aid of bearing down or manual pressure. The placenta must not be adherent, and the fetal head must fit tightly in the brim or the cavity of the pelvis.

2. Suction is effective because the pelvis is separated from the upper part of the abdomen by the head or the third-stage uterus, effectively sealing the entrance to the pelvis.

3. The postpartum uterus is exceptionally firm and is apparently almost completely exsanguinated by decompression. It is not yet known with certainty whether the atonic postpartum uterus can be treated effectively by decompression.

4. Decompression in the second stage should be done apart from contractions, in order to avoid impairment of placental circulation.

5. Less work has to be done within the birth canal during expulsion, because with decompression other pelvic viscera also contribute to the forcing open of the pelvic diaphragm. The fetal head accordingly does not take the full force of the pressure gradient as is the case when expulsion results from longitudinal axial pressure. The force expelling the fetus naturally is of the order of 22 pounds (10 Kg.) but with decompression it is less than 8 pounds (3.6 Kg.).

6. The art that seems to be attainable in the second stage is to drive the fetal head through the pelvis in the shortest possible time, while using the minimum force required for the purpose.

ZUSAMMENFASSUNG

Es wird über ein Verfahren der Anwendung des Saugens am Beckenausgang und über die dazu verwendete Apparatur berichtet. Die Ansaugung wurde im zweiten und dritten Stadium des Geburtsvorganges ausgeführt. Die Arbeit enthält eine tabellarische Aufstellung der ersten dreissig Fälle, die im dritten Stadium behandelt wurden. Es wird erklärt, wie der Mechanismus der Druckherabsetzung zustande kommt. Experimentelle Ergebnisse stützen die Hypothese des Verfassers und bekräftigen seine Auffassung von dem vorher beschriebenen Mechanismus der Dekompression.

Die Schlussfolgerungen, die aus den Untersuchungen des Verfassers gezogen werden können, berühren grundsätzliche Fragen und Probleme der Anwendbarkeit. Die Schlussfolgerungen sind folgende:

1. Die Dekompression des Beckenausgangs führt zur Geburt der Plazenta und des kindlichen Kopfes durch das Becken ohne Hilfe von Austreibungswehen oder manuellem Druck. Die Plazenta darf nicht anhaftend sein, und der kindliche Kopf muss genau in den Rand oder die Höhle des kleinen Beckens passen.

2. Das Saugen wird wirksam, weil das Becken vom Oberbauch durch den Kopf oder durch den im dritten Stadium befindlichen Uterus getrennt ist, wodurch der Beckeneingang wirksam verschlossen wird.

3. Der Uterus nach der Entbindung ist aussergewöhnlich fest und offenbar durch Dekompression völlig ausgeblutet. Es ist noch nicht sicher bekannt, ob ein nach der Entbindung atonischer Uterus wirksam mit Dekompression behandelt werden kann.

4. Im zweiten Stadium der Entbindung sollte die Druckherabsetznug nicht zur gleichen Zeit mit den Kontraktionen des Uterus ausgeführt werden, um eine Behinderung des plazentaren Blutkreislaufs zu vermeiden.

5. Die erforderliche Arbeitsleistung innerhalb des Geburtskanals bei der Austreibung der Frucht ist geringer, weil mit Dekompression andere Beckenorgane sich an der Eröffnung des Beckenausgangs beteiligen. Dementsprechend empfängt der kindliche Kopf nicht die volle Kraft des Druckgefälles, wie es bei Austreibung durch Druck in der Längsachse der Fall ist. Normalerweise beträgt die Kraft der Austreibung der Frucht etwa 10 kg, mit Dekompression jedoch weniger als 3,6 kg.

Im zweiten Stadium besteht die Kunst darin, den kindlichen Kopf in möglichst kurzer Zeit unter Anwendung stärkster Kraft durch das Becken zu treiben.

RÉSUMÉ

L'auteur décrit l'équipement et la méthode utilisés pour la succion de la région du détroit inférieur du bassin. La succion a été pratiquée au cours des 2e et 3e stades du travail de l'accouchement. Un tableau montre les 30 premiers cas du 3e stade, et le mécanisme de décompression est exposé. Les données expérimentales correspondent aux hypothèses, et l'auteur pense qu'elles prouvent le mécanisme décrit.

Les conclusions à tirer de cette étude ont trait aussi bien à des considérations fondamentales qu'expérimentales:

1. La décompression du détroit inférieur du bassin permet la délivrance du placenta et le passage de la tête à travers le bass in sans l'aide de la traction ou de la pression manuelle. Le placenta ne doit pas être adhérent et la tête du foetus doit être adaptée à la cavité du bassin.

2. La succion est efficace car le bassin est séparé de la partie supérieure de l'abdomen par la tête de l'utérus au 3e stade, obiturant effectivement l'entrée du bassin.

3. Après l'accouchement l'utérus est exceptionnellement ferme et il est apparemment presque exsange par suite de la décompression. Il n'est pas encore établi avec certitude si l'utérus atonique après l'accouchement peut être traité efficacement par décompression.

4. La décompression au 2e stade devrait être pratiquée indépendamment des contractions afin d'éviter une diminution de la circulation placentaire.

5. Le travail à l'intérieur de la filière pelvienne est diminué pendant l'explusion, car avec la décompression, d'autres viscères pelviens contribuent aussi à forcer l'ouverture du diaphragme pelvien. La tête du foetus ne subit par conséquent pas toute la pression d'inclinaison, comme c'est

le cas lorsque l'expulsion résulte d'une pression axiale longitudinale. La force expulsant naturellement le foetus est de l'ordre de 10 kg, mais elle est inférieure à 3.6 kg avec la décompression.

La dextérité qu'il semble possible d'atteindre au 2e stade consiste à conduire la tête du foetus à travers le bassin le plus rapidement possible, en utilisant à cet effet le maximum de force.

RIASSUNTO

Viene descritto un apparecchio per esercitare une depressione attorno all'imbocco pelvico. L'aspirazione viene esercitata nel secondo e nel terzo stadio del travaglio. Viene presentata una tavola con i dati relativi ai primi 30 casi così trattati, e fornita la spiegazione del meccanismo della decompressione. I dati sperimentali coincidono con le ipotesi. Le conclusioni sono le seguenti:

1. La decompressione pelvica determina l'espulsione della placenta e della testa fetale senza l'aiuto della compressione manuale. La placenta non deve essere aderente e la testa fetale deve aderire perfettamente al contorno pelvico.

2. L'aspirazione è efficace perchè la pelvi è separata dalla parte superiore dell'addome dalla testa o dall'utero che effettivamente sigillano l'ingresso pelvico.

3. L'utero, dopo questo tipo di parto, è insolitamente s o l i d o e apparentemente svuotato di tutto il sangue ad opera della decompressione. Non si sa ancora con certezza se una atonia post-partum dell'utero potrà giovarsi della decompressione.

4. La decompressione nel secondo stadio può essere eseguita anche non in presenza di contrazioni, poichè evità l'insufficienza circolatoria placentare.

5. Meno lavoro è necessario nel canale del parto durante l'espulsione, perchè con la decompressione anche altri visceri pelvici contribuiscono a forzare l'apertura del diaframna pelvico. La testa fetale, di conseguenza, non deve sopportare tutta la forza di pressione, come nel caso in cui l'espulsione avviene per compressione esercitata lungo un asse longitudinale. La forza espulsiva del feto, abitualmente, è dell'ordine dei 10 kg, ma con la decompressione diviene inferiore ai kg 3,6.

Lo scopo che sembra di poter raggiungere nel secondo stadio è di condurre la testa fetale attraverso la pelvi nel tempo più breve possibile e usando la massima forza per questo scopo.

RESUMEN

Se trata este trabajo del equipo y método para la succión en el entrecho pelviano, inferior. Esta succión se lleva a cabo en los períodos 2° t 3° del parto. También se incluye una tabla de los primeros 30 casos de 3° período en que se ha usado. Se explica así mismo cómo actúa el mecanismo de decompresión. Los datos experimentales corresponden con la hipótesis del autor y confirman el citado mecanismo.

Las conclusiones derivadas de estas investigaciones, con sus aplicaciones básicas y prácticas son las siguientes:

1. La decompresión del estrecho superior libera la placenta y la cabeza fetal sin necesidad de tracción ni de presión manual. La placenta no debe ser adherente y la cabeza debe ajustar firmemente al borde de la cavidad de la pelvis.

2. El útero post partum es excepcionalmente firme y aparentemente casi exangüe. No se conoce aún con certeza si el útero atónico post partum puede ser tratado eficazmente por la decompresión.

3. La succión es efectiva ya la pelvis está separada del resto del abdómen por la cabeza o por el útero en el 3° período cerrando exactamente la entrada de la pelvis.

4. La decompresión debe hacerse en el período segundo fuera del momento de las contracciones para evitar trastornos de la circulación placentaria.

5. Con la decompresión se requiere

menos trabajo dentro del canal durante la expulsión ya que otras vísceras contribuyen a forzar el paso a través del diafragma pelviano.

De acuerdo con esto la cabeza fetal no sufre toda la presión determinada por el desnivel de fuerzas tal como ocurriría cuando la expulsión axial longitudinal. La fuerza de expulsión normal del feto es de unos lo kilos, pero con la decompresión queda reducida a menos de 4. La habilidad durante el segundo período consiste en reducir la cabeza fetal a través de la pelvis en el tiempo más corto posible mientras se usa para ello el máximo de fuerza posible.

SUMARIO

São apresentados, equipamento e método usados para sucção em torno da passagem pélvica. A sucção foi levada a efeito no segundo e terceiro estágios de trabalho. Inclui uma tabela de todos os primeiros 30 terceiros estágios e uma explanação sôbre o mecanismo de descompressão. Dados experimentais concordam com a hipótese, e na opinião do autor corroboram com o mecanismo acima mencionado.

As conclusões a serem tiradas das investigações dizem respeito a considerações básicas e aplicadas. São as seguintes:

1. A descompressão na passagem permitirá a saida da placenta e cabeça fetal sem o auxílio de manobras ou pressão manual. A placenta não deve ser aderente, e a cabeça fetal deve se ajustar ao rebordo da cavidade pelvica.

2. A sucção é eficiente porque a pelvis é separada da porção superior do abdomen pela cabeça ou útero em 3° estágio, que efetivamente fecham a entrada para a pélvis.

3. O útero post-partum é excepcionalmente firme e quase exangue devido a descompressão. Desconhece-se ainda se o útero atonico post-partum possa ser eficientemente tratado pela descompressão.

4. A descompressão no 2° estágio deve ser feita longe das contrações, afim de evitar perturbações na circulação placentária.

5. Menos trabalho deve ser feito no interior do canal de parturição, durante a expulsão, porque com descompressão outras víceras pélvicas também contribuem para manter aberto o diafragma pélvico. A cabeça fetal não recebe a força total do grandiente pressão como é o caso quando a expulsão resulta da pressão axial. A força expulsora do feto é da ordem de 22 onças (10 kgs.) reduz-se com a descompressão para menos de 8 onças (3,6 kgs.).

No segundo estágio deve-se conduzir a cabeça fetal através da pelvis, no mínimo tempo possível, com o máximo de força para tal.

The doctor sees all the weakness of mankind, the lawyer all the wickedness, the theologian all the stupidity.

—*Schopenhauer*

Carcinoma of the Larynx: A Review

S. N. SARMA, M.B. (Cal.), D.L.O. (Lond.), F.R.C.S. (Edin.), F.I.C.S.*

DIBRUGARH, ASSAM, INDIA

THE problem of carcinoma of the larynx presents several facets, i.e., classification, incidence, etiologic factors and treatment. In recent years carcinoma as a whole has ascended the ladder of the greatest killers and now occupies a position amongst the first three. Its incidence varies from nation to nation with regard to both sites in the body and regions of the country. The same is true of laryngeal carcinoma, but, owing to the lack of one standard classification, there is still great confusion in the mode of reporting, and the task of comparison becomes hard. A survey of the literature on this topic from 1900 to 1957 brings out the following points:

Since Leborgne[1] wrote, much literature on carcinoma of the larynx has been collected in a relatively recent period. This disease was but vaguely known in olden times. In 1790 Morgagni referred to 2 of Valsalva's cases; these were actually cases of laryngopharyngeal carcinoma. The history through 1833 to 1876 shows a gradual increase in the number of cases noted after Gracia's invention of the laryngoscopic mirror.

Carcinoma of the larynx is no longer a rare disease. Successive contributions in the clinical, surgical, anatomical, pathological and roentgenologic fields have increased knowledge and experience. One of the urgent needs of research undertaken to improve methods of treating carcinoma is the adoption of uniform classification and staging of the disease. Unless facts and observations can be classified by a method capable of similar application by different observers, it will be impossible to understand the behavior of the disease under various methods of treatment. Should an international agreement be reached as to nomenclature and classification of carcinoma of the larynx, a formidable series of comparable clinical material could be obtained.

*Professor of Ear, Nose and Throat Diseases, Assam Medical College, Dibrugarh.

Lecture delivered before the Bihar State Branches of the Association of Otolaryngologist and Ophthalmologist of India in their combined annual general meeting, held on 5th December 1958, in the Patna Medical College, Patna.

Submitted for publication July 2, 1959.

The difficulties encountered owing to the lack of a standard classification of laryngeal carcinoma are pointed out and the necessity for such a classification emphasized. The incidence of the tumor in different parts of the world—it is high in India and highest in Assam—is outlined, with accompanying statistics. Various etiologic factors, among them the smoking and chewing of tobacco, are considered, and various authorities are cited. The present tendency is toward surgical treatment.

The classification of Krishaber and Isambert, more than seventy-five years old, continues to be applied by many authors, but in different ways, thus leading to confusion. Because of this confusion, the anatomic sites of carcinoma of the larynx as described by the International Committee for Stage Grouping in Cancer and for the Presentation of the Results of Treatment of Cancer (referred to as the I.C.P.R.) in Copenhagen, July 1953, is extremely welcome. If some such classification is accepted both by surgeons and by radiotherapists, comparison of the results would be possible.

The International Union Against Cancer is trying to evolve an agreed classification and has submitted draft classification in 1956, which is awaiting completion. The International Congress of Otolaryngologists has formed an International Committee for the study of laryngeal carcinoma. They have requested the profession in India to form a committee for this purpose. It is therefore necessary for the profession in India to take part in it, especially in view of the high local incidence of the disease.

TABLE 1.—*Distribution of all the Persons Examined as Assamese and Non-Assamese and According to Sites of Carcinoma in the Upper Part of the Alimentary Tract*

	Assamese	*Non-Assamese*	*Total*
1. Lip to Esophagus			
Larynx	88	20	108
Esophagus	35	10	45
Tonsil	23	8	31
Pharynx	13	7	20
Tongue	12	4	16
Lip	5	1	6
Cheek	3	1	4
Gum	x	1	1
Totals	186	52	238
2. Tumors of other regions	52	32	84
3. Nontumor cases	2,495	1,183	3,678
Totals	2,733	1,267	4,000

From these observations it will be seen how far carcinoma of the laryngeal region and laryngopharynx outnumbers carcinoma of any other region. It forms 33 per cent of all tumors of the body and 50 per cent of carcinomas of the upper part of the alimentary tract in this hospital. More than 90 per cent of the tumors were of the extrinsic variety.

Incidence.—In 1954, Drs. William H. Baltzell and F. Johnson Putney reported that during the twenty-five years from 1928 to 1953, 1,498 cases of carcinoma of the larynx were observed in the bronchoscopic clinic of Jefferson Hospital. The variable factors were minimized, as the records had been kept in a uniform manner for the entire period under the direction and management of one person, Dr. Louis H. Clerf. These reports serve to place statistical material on record; when they are compared with those from other sources, more knowledge of laryngeal carcinoma may be gained. A final decision on the basis of data from one source is hazardous.

Comparison with total number of patients admitted to the bronchoscopic clinic for these periods indicates an increased incidence, almost uniformly tripling for each period, and signifies that the disease has been encountered seven times as frequently in the past ten years as it was twenty-five years ago. This incidence is more striking when it is considered that laryngeal carcinoma was diagnosed and treated in relatively few clinics twenty years ago, whereas in the past decade the disease has been handled in almost all parts of the country and by most qualified laryngologists. This expansion parallels that of pulmonary carcinoma and may be part of the general increase in carcinoma of the respiratory tract, but it does not approximate the phenomenal increase of bronchogenic carcinoma. Whether this increase of laryngeal carcinoma is absolute and real cannot

TABLE 2.—*Distribution of Cancer Cases in Different Regions of the Upper Alimentary Tract Coming to E. N. T. Department, Assam Medical College Hospital, Amongst Assamese and Non-Assamese People*

	1950		1951		1952		1953 (up to May)		Total
	Non-Assamese Person	Assamese Person	Non-Assamese Person	Assamese Person	Non-Assamese Person	Assamese Person	Non-Assamese Person	Assamese Person	
Cheek	x	x	x	x	1	x	1	x	2
Tongue	2	x	4	3	1	1	1	1	13
Pharynx	x	x	x	1	x	2	1	2	6
Esophagus	1	10	4	16	1	11	5	10	58
Larynx	18	43	12	47	16	51	7	23	217
	intrinsic		intrinsic		intrinsic				
		1		1		1			3
Tonsil	x	3	2	3	1	6	1	4	20
Palate	x	x	x	x	x	2	x	x	2
Totals	21	57	22	71	20	74	16	40	321

be answered, for it may be due to the fact that a greater number of cases are being referred to the clinic for diagnosis and treatment. If it is general throughout the country, it should substantiate an actual increase in incidence.

As regards India, information from various hospitals concerning the prevalence of carcinoma is scanty. An attempt was made for the first time by Nath and Grewal (cited by Khandkar[3]) to survey the extent of what they termed the "cancer menace" in India through a study of hospital records in most of the principal medical centers. A careful analysis of their published reports simply reveals that all types of malignant disease occur in India. There is no definite information about laryngeal carcinoma.

Dr. B. Tirumal Rao reported in 1944, from his experience in Vizagapattam, India, from 1936 to 1940 that the incidence of carcinoma of the larynx and laryngopharynx was only 2 per cent, stating that this corresponds closely to English figures. He further stated that during fifteen years he encountered only 75 cases of malignant growths of the larynx and laryngopharynx and that he considered the disease uncommon in that area.

The information presented by the Tata Memorial Hospital Bombay (India)[1] in 1950 is interesting. It is noted that there is an increased incidence of oral and laryngeal carcinomas in Bombay and a relative predominance of mammary and gastrointestinal carcinomas in London.

Carcinoma of the larynx, with an incidence of 12.1 per cent, constitutes an impressive feature in men from the fourth to the seventh decade of life in Bombay. The lesion is located in the extrinsic portion in more than 75 per cent of the cases and roughly corresponds to the distribution noted by Hayes Martin in New York. A distribution of carcinomas according to site shows notable difference between communities in Bombay.

My own analysis of the cases of carcinoma observed in the whole Assam Medical College Hospital, Dibrugarh, India, from 1948 to 1951 and in 1953 show the incidence of laryngeal carcinoma to be 50 per cent for this hospital.

Analysis done from a survey under I.C.M.R. from January 1954 to March 1955[6] shows the distribution among unselected persons of all varieties of disease coming to the Assam Medical College Hospital in Dibrugarh, India.

Thompson and Negus mention in their book that carcinoma of larynx accounts for only 2 per cent of all carcinomas. Scot Stevenson writes that carcinoma of the

larynx is much less frequent than carcinoma of the stomach or uterus, but in the Assam Medical College Hospital there were 186 cases of laryngeal against 10 of gastric and 29 of uterine carcinomas. Practically all the laryngeal carcinomas were of the extrinsic variety, except 1. Negus encountered only 187 cases of laryngeal carcinoma in twenty years and Semon 212 cases in twenty-eight years, but I observed 186 cases of laryngeal carcinoma in a little more than three years, from 1948 to 1951.

Compared with the incidence of carcinoma of the larynx with other available figures:

New York	1917-1929	3.1%
London County Hospital	1938-1939	3.4%
Bombay Tata Hospital	1941-1945	12.1%
Assam Medical College Hospital, Dibrugarh	1948-1951	1.5%

Two hundred and ten cases were of the larynx out of 310 cases and more in the Assamese people.

It showed incidence of carcinoma of the larynx to be very high in Assam and that Assamese people were more prone to it.

In 1954, Curwen, Kennway and Kennway,[7] reporting on the incidence of carcinoma of the lung and larynx in urban and rural districts, said—in contrast to the well known large increase in deaths ascribed to pulmonary carcinoma, in the laryngeal type there has been little change over the past twenty years, judging by the mortality statistics in England and Wales. In view of the aging population, this fairly constant level indicates a fall in the mortality rate.

Carcinoma of the lung and larynx in the male shows similar relation to urban and rural conditions. In the case of pulmonary carcinoma the greater incidence in town has been attributed to greater consumption of tobacco; but the constancy of the mortality rate of carcinoma of the larynx in recent years suggests that smoking has no carcinogenic effect upon the larynx and that some other reason must be sought for the difference between town and country. The following points were noted:

1.—Carcinoma of the larynx is four times as common in men as in women.

2.—In men, intrinsic carcinoma is barely twice as common as extrinsic, whereas in women the extrinsic type is four times as common as the intrinsic.

3.—Intrinsic carcinoma occurs thirteen times as often in men as in women; extrinsic carcinoma, twice as often.

In 1956, Wynder, Bross and Dey[8] remarked that the incidence of laryngeal carcinoma in the United States was currently estimated as between 3 and 4 per 100,000 of population. The rate in Western Europe was similar. The frequency of laryngeal carcinoma is particularly high in India, where, in a series of 5,640 cases of carcinoma at Tata Memorial Hospital 12.1 per cent of the growths occurred in the larynx.

Possible Increase.—The increased incidence shown by Jackson in 1941 is not borne out by data available today, though some increase has occurred in the United States. Baltzell and Putney's report (1928-1948) showed an increase. Data of the National Cancer Institute from 1937 to 1947 on nine American cities show a 42 per cent increase in mortality and a 75 per cent increase in incidence of laryngeal carcinoma. Vital statistics of the United States Government show an increase of 47 per cent in mortality from 1930 to 1945. Recent data from England do not show any appreciable change in the mortality rate of laryngeal carcinoma during the past forty years. It is important to distinguish between mortality and morbidity data, because of the relatively high survival rate among patients with carcinoma of the larynx.

From these data it is evident that laryngeal carcinoma is particularly high in India, reaching its peak incidence in Assam.

Etiologic Factors.—In 1955 Maxwell[9]

noted that few will refuse to admit that there has been a great increase in the incidence of "cancer of the lung" or bronchial carcinoma within the past thirty years, and that this may be closely related to the rise in consumption of cigarettes during the same period.

Among the first to suggest inhalation of irritant substances as a possible cause was Duguis, who in 1927 reported a high incidence among outdoor workers. In 1929, Maxwell and Nicholson suggested tobacco smoking as possibly an important cause.

Concentration of any inhaled carcinogenic substances would be higher in the larynx than in the bronchi, and in 1933 an analysis published by Maxwell and Ellis showed a slight increase in laryngeal carcinoma as a useful basis for comparison with the pulmonary form. The authors consider it now certain that bronchial carcinoma has increased and is still increasing in frequency, and the analysis shows that carcinoma in general continues to increase steadily. For carcinoma of the larynx, however, no absolute increase has been noted in the annual reports for the past thirty years; thus the proportion has fallen for laryngeal carcinoma and carcinoma of the esophagus, a similar disease.

If the inhalation of carcinogenic substances is an important factor in laryngeal carcinoma, what can be the reason for this diminution? It may be that the laryngeal mucous membrane is much less sensitive to the inhaled irritant than are the bronchi, but carcinogens act strongly on squamous cell epithelium, so carcinoma of the larynx should have increased also. The authors suggested, therefore, that to reconsider whether tobacco smoke is a cause or not or some unsuspected factor is responsible.

In 1953, 1954 and 1956[10] I suggested from figures in Assam Medical College Hospital that, the incidence being high in Assam, it was to be suspected that there is something in the food habits of the people there which might be the cause. Since Assam is a coal and oil bearing area there might be some carcinogenic substances in its food and soil. In the search for such substances, it was found that the people here are very much used to the betel nut chewing habit, which is quite different from other parts of India. This habit is least common in Punjab, and increases toward the southern and eastern parts of India and is very common in Assam, the easternmost state. The incidence of laryngeal carcinoma is said to be minimum in Punjab, only 1 per cent, but authentic figures are not available.

It was also noted that the betel nut used in Assam was different from those used in other parts of India. In other parts, it is the Supari, which is mature betel nut, dried after boiling in water.

In Assam following types are used: (1) premature raw; (2) mature raw; (3) mature, after being kept underground for a year or so, and (4) Supari, used mostly by the non-Assamese people.

As to the character of the various local types of betel nut, some of them are highly irritant, and this quality varies in products of different localities. It produces (1) dulling of the sensation of taste in the tongue; (2) flushing of the face and head and heat all over the body; (3) giddiness and vomiting, and (4) rawness and ulcer of the tongue. These are more pronounced in certain types and in people who have only recently begun to take it, since those coming from outside are often afraid to take it. Those who start taking it, however, find it difficult to leave off. Supari produces none of these symptoms except rawness of the tongue.

The I.C.M.R. inquiry into the cause of carcinoma of the larynx and adjacent parts in Assam in 1954 and 1955 revealed the habit of the betel nut is very common in Assam; that a large number of non-Assamese persons take this Assamese type of

betel nut, and that all but 8 of the 238 patients with carcinoma were addicts. Three of these were Assamese and 5 non-Assamese. The type of betel nut used in 203 cases was the Assamese type; in 19, a non-Assamese type, and in 9, mixed. It was concluded that there is a close relation between the high incidence of laryngeal carcinoma in Assam and the habit of chewing the Assamese type of betel nut.

In 1955 Khanolkar[11] wrote that the habit of chewing was associated with carcinoma of the oral cavity; the combined habit of smoking and chewing, with carcinoma of the hypopharynx and the base of the tongue, and smoking only with carcinoma of the oropharynx and the esophagus.

Wynder and his coworkers, in 1956, stated that enviromental surveys of carcinoma at that time concerned tumors of the epidermoid type and that data obtained from animal experiments suggest that such carcinomas rarely occur in areas not subject to the influence of extrinsic irritant factors.

An extensive literature on pulmonary carcinoma is now available. In contradistinction, relatively few data are available with regard to significant environmental factors in carcinoma of the larynx, and still fewer are based on reliable statistical evidence.

As study of the various possible etiologic factors in laryngeal carcinoma among white American men showed that few such factors, except alcohol and tobacco, have any significant influence.

In a subsequent paper the same authors[12] have stated that data on 209 cases of laryngeal carcinoma in the United States, 138 cases in India and additional cases in Sweden indicated that this neoplasm occurred but rarely in American men who were nonsmokers or light smokers. Heavy consumption of whiskey increased the risk.

In India, extrinsic laryngeal carcinoma was considered related to both bidi and betel nut chewing. The Swedish data on extrinsic carcinoma of the larynx in women revealed a relation to dietary deficiencies, which could not be demonstrated from the American data. No relation to voice strain, syphilis, tuberculosis, occupation or family history was verified.

An editorial in the British Medical Journal for June 1956[13] on the causes of carcinoma of the larynx summarized the position nicely.

Air-borne substances carcinogenic to the bronchi are not necessarily so to the larynx, simply because they have to pass the larynx before they can reach the bronchi. None of the industrial causes of pulmonary carcinoma are known to be causes of laryngeal carcinoma, and it would not be surprising if the carcinogenic effect of smoking were also restricted to the mucosa below the bifurcation of the trachea. That this should be so may even be inferred from the sharp contrasts in the trends of death rates from those associated with bronchial and laryngeal carcinomas. The mortality rate of laryngeal carcinoma has remained constant in Britain over the past forty years, while the mortality rate of bronchial carcinoma and the consumption of cigarettes have both rapidly increased. It is therefore difficult to interpret the observation now made by Wynder and his co-workers (*Cancer* 9:86, 1956) and five other groups of investigators that carcinoma of the larynx and smoking of tobacco are closely associated. If they are, why has laryngeal carcinoma not increased in incidence like carcinoma of the lung? There can be no doubt that it has not, but the difference in behavior of the two types may not be as great as has been estimated from comparison of the death rates. Mortality data can give a reasonably accurate picture of the incidence of pulmonary carcinoma, because the lethal power of the disease is so great, but they may not provide an ac-

curate picture of the incidence of laryngeal carcinoma, because its mortality rate is substantially lower and has decreased in recent years. In the United States there was a 75 per cent increase in the incidence of laryngeal carcinoma between 1937 and 1947, but the mortality rate increased by only 4 per cent. The incidence of laryngeal carcinoma, therefore, may have increased in Britain, though the mortality rate has remained steady.

Again, laryngeal carcinoma may be related to all types of smoking, whereas the pulmonary type may be related only to cigarette smoking. If this should prove true, the incidence of laryngeal carcinoma should increase only slightly compared to that of the pulmonary form, for recent change in smoking habits has consisted largely of the change to cigarettes, and the actual consumption of tobacco has risen comparatively little. The evidence, however, is not conclusive or consistent.

Finally, the possibility exists that some other environmental factor that contributes to laryngeal carcinoma may have become less prevalent and so has cancelled out the effect of increased tobacco consumption. This may be alcohol, which is said to play a part in laryngeal carcinoma. The great reduction in excessive drinking of spirits in Britain during the past fifty years may have contributed to some extent in countering the effect of other factors. It would be unjustifiable, therefore, to conclude from the vital statistics alone that there is anything contradictory in the observation that both types of carcinoma are produced to some extent by tobacco.

Carcinoma of the larynx is not one disease but a group of diseases, having, in all probability, different causes. The difference in classification of sites has caused confusion.

Differences in the causation of the intrinsic and extrinsic forms may also account for the peculiar observation that carcinoma of the larynx in men is more common in large towns.

Neither of the most recent studies indicates any evidence that tuberculosis or syphilis is a cause.

For prevention, the public should be educated about carcinogenic effects of their common daily habits.

From these it will be seen that, at present, cigarettes, alcohol and the chewing of betel nuts (Pan) are the factors that have some relation to carcinoma of the larynx.

To understand the problem, however, as has been pointed out, a uniform method of reporting and classification is already of prime importance, and a regular standard recording system is needed in India also.

Treatment.—Treatment has also varied from decade to decade, and has mainly centered around operation and irradiation, with stress on the one or the other. Before the advent of antibiotics the surgical procedures were formidable and were limited to few centers and experts. People depended more on radiation. It was ultimately concluded that, so far as intrinsic carcinoma is concerned, the two methods gave equally good results from the standpoint of cure. Irradiation of the extrinsic varieties gave variable results. In many cases the primary growth disappeared, but the tumors recurred after some time and seldom responded again. Since the advent of antibiotics, surgical treatment has become much safer, and at present opinion seems to veer again toward surgical procedures for extrinsic varieties—laryngectomy, laryngopharyngectomy or glossolaryngopharyngectomy, with or without dissection of the glands at the same time or later.

Experience in Assam Medical College Hospital also confirms this—surgical intervention gives much better results than does irradiation alone. In the past three years I have performed twelve laryngectomies and several laryngofissures, with only one operative death. All of the re-

maining patients are still alive after three years, without recurrence. I have trained them in esophageal speaking.

ZUSAMMENFASSUNG

Es wird auf die Schwierigkeiten hingewiesen, denen man wegen des Fehlens einer einheitlichen Klassifizierung des Kehlkopfkrebses begegnet, und die Notwendigkeit, eine solche Klassifikation zu schaffen, wird hervorgehoben.

Es wird auf die Häufigkeit dieser Geschwulst in verschiedenen Teilen der Welt hingewiesen. Sie ist gross in Indien und am grössten in Assam. Statistiken werden angegeben.

Verschiedene ursächliche Faktoren werden untersucht. Die grösste Wahrscheinlichkeit haben gegenwärtig das Rauchen und das Tabakkauen. Mehrere Fachleute werden zitiert.

Zurzeit besteht eine Vorliebe für chirurgische Behandlung.

SUMARIO

Refere as dificuldades de classificação do carcinoma laringëo e propõe a necessidade de adotar uma delas. Indica a incidência do tumor em diferentes paises; diz que é alta na India e mais alta no Assam. Apresenta estatisticas. Faz a revisão dos fatores etiologicos, citando como mais provaveis o tabagismo por aspiração e mastigação. A tendencia de tratamento atualmente é para os metodos cirurgicos.

RIASSUNTO

Vengono messe in rilievo le difficoltà pratiche che derivano dalla mancanza di una classificazione dei carcinomi della laringe; tale classificazione è divenuta necessaria.

Vengono riportate le cifre di frequenza di questo tumore nelle varie parti del mondo; esse è frequente in India e ancor più nell'Assam.

Vengono elencati i vari fattori etiologici: oggi i più attivi sono il fumo e il masticare tabacco.

La cura, attualmente, è preferibilmente chirurgica.

RESUMEN

Se llama la atención sobre las dificultades para establecer una classificación de los carcinomas laríngeos y se recalca sobre la recesidad de adoptar una tal clasificacion.

Es de notar la frecuencia de la tumoración en las diferentes partes del mundo. Es muy frecuente en la India y Assam.

Se presentan varias estadísticas. Se llama la atención sobre varios agentes etiológicos. Hoy día las causas más problbles son el fumar y el mascar tabaco.

Hoy día la tendencia general es hacia el tratamiento quirúrgico.

RÉSUMÉ

L'auteur insiste sur la nécessité d'adopter une classificationtype pour le carcinome du larynx et met en évidence les difficultés auxquelles l'on se heurte du fait qu'une telle classification n'existe pas.

L'incidence géographique de cette affection est indiquée avec statistiques à l'appui. Elle est élevée aux Indes et atteint son maximum en Assam.

Divers facteurs étiologiques sont mis en évidence, dont le responsable le plus probable est pour l'instant le tabac (fumé et chiqué). De nombreuses autorités en la matière sont citées.

La tendance actuelle est orientée vers le traitement chirurgical.

REFERENCES

1. Leborgne, F. E.: Classification of Carcinoma of the Larynx, Laryngoscope **63**:1089-1095, 1953.
2. Baltzell, W. H., and Putney, J. F.: Cancer of the Larynx, General Data and Symptoms: A Review of 1,498 Cases, Arch. Otolaryngol. **60**:478-481, 1954.
3. Khanolkar, V. R.: Cancer in India, Acta de la Unio. Int. centre. le cancer **6**:881-890, 1950.

4. Rao, B. T.: Laryngeal carcinoma, J. Indian M. A. **14**:95, 1944.

5. Sarma, S. N.: The Problem of Cancer in Assam, with Special Reference to Cancer of the Larynx, Indian M. A. Med. Asso. **20**:412-414, 1951. Incidence of Cancer of the Larynx in Assam, Indian J. Otolaryngol. **4**:118-120, 1952. On Cancer of the Larynx, ibid. **5**:75-78, 1953.

6. Sarma, S. N.: Inquiry into the Etiology of Cancer of the Larynx in Assam. Technical Report, Scientific Advisory Board, I.C.M.R., 1954, pp. 271-275.

7. Curwen, M. P.; Kennway, E. L., and Kennway, N. M.: The Incidence of Cancer of the Lung and Larynx in Urban and Rural Districts, Brit. Cancer **8**:181, 1954.

8. Wynder, L.; Bross, I. J., and Dey, E.: A Study of Environmental Factors in Cancer of the Larynx, Cancer **9**:86-110, 1956.

9. Maxwell, J.: Incidence of Cancer of the Larynx in Relation to Incidence of Cancer of Bronchi, Lancet **1**:268, 1955.

10. Some Aspects of Etiology of Cancer of the Larynx. Indian J. Otolaryngol. **8**:20-25, 1956. A Study into the Incidence and Etiology of Cancer of the Larynx and Adjacent Parts in Assam, Indian J. M. Research **46**:525-533, Sarma.[6]

11. Sanghvi, L. D.; Rao, K. C. M., and Khanolkar, V. R.: Smoking and Chewing Tobacco in Relation to Cancer of the Upper Alimentary Tract, Brit. M. J. **1**:4, 1955.

12. Sanghvi, L. D.: Epidemiological Approach to the Etiology of Cancer of the Larynx, J. A. M. A. **160**:1384, 1956.

13. Editorial: Etiology of Cancer of the Larynx, Brit. M. J. **2**:1533-1534, 1956.

ADDITIONAL SOURCES

Lindsay, J. R., and Ironside, W. M. S.: Carcinoma of the Larynx: Classification and Results of Treatment, Laryngoscope **65**:1117-1728, 1955.

Sadowsky, D. A., and others: Smoking and Carcinoma of the Lung, J. Nat. Cancer Inst. **13**:1237, 1953.

I do not know a better training for a writer than to spend some years in the medical profession. I suppose that you can learn a good deal about human nature in a solicitor's office; but there on the whole you have to deal with men in full control of themselves. They lie perhaps as much as they lie to the doctor, but they lie more consistently, and it may be that for the solicitor it is not so necessary to know the truth. The interests he deals with, besides, are usually material. He sees human nature from a specialized standpoint. But the doctor, especially the hospital doctor, sees it bare. Reticences can generally be undermined; very often there are none. Fear for the most part will shatter every defense; even vanity is unnerved by it. Most people have a furious itch to talk about themselves and are restrained only by the disinclination of others to listen. Reserve is an artificial quality that is developed in most of us but as the result of innumerable rebuffs. The doctor is discreet. It is his business to listen and no details are too intimate for his ears.

—*Maugham*

Plastic and Reconstructive Surgery

Skin and Cartilage Homografts*: New Trends in Research and Clinical Use

LYNDON A. PEER, M.D., F.I.C.S., F.A.C.S., I. S. WALIA, M.D.
AND
RUTH J. PULLEN, R.N.
EAST ORANGE, NEW JERSEY

Skin grafts and their indications, application and survival are discussed, as are variations in their behavior as related to different types of patients and different pathologic conditions. The results and probable results of skin grafts exchanged between parents and children are described, as is the influence of blood transfusion on the life of the graft. The homograft problem, the author points out, is still far from a solution, but considerable progress has been made.

MAN'S discovery of grafting tissues has its roots in the far-away past of prehistoric medicine. Early men of the Cro-Magnon type in various parts of the world performed the trephining operation with flint knives to cure epilepsy, headache or mental disease. The ancient Peruvians covered the trephine opening in the bone with a gold plate, to prevent a soft spot in the patient's skull that would be vulnerable to an enemy's knife or hand ax and to serve as a barrier against the entrance of an evil spirit. It is possible that these early surgeons occasionally replaced the bone removed at the trephining operation or used a piece of bone taken from another skull; if so, this would represent the first use of bone autografts and bone homografts.

Primitive races in various parts of the world until quite recently used bone grafts to replace a bone destroyed by injury or disease. Preference was given to the bone of a freshly-killed dog or sheep. This use of osseous heterografts, by inference, acquaints the modern reader with bone grafting in very early times, since surgical lore among primitive people was passed down from father to son through countless generations.

In skin grafting, Ollier and Thiersch used both autografts and homografts but reported that the autografts were more often successful. In spite of their observations, however, later surgeons made little distinction between a graft from the patient's own tissue and grafts taken from other human beings or even from animals.

From St. Barnabas Rehabilitation Center, Newark, New Jersey.
*Supported (in part) by Public Health Service research grant No. A-3047, Division of Arthritis and Metabolic Diseases, and the Louis D. Beaumont Foundation.
Submitted for publication Dec. 15, 1959.

All apparently were good "takes" to the enthusiasts of the day. Gradually the more conservative surgeons gave up attempts to graft animal tissues to man and agreed that homogenous transplants from one human being to another were rejected, owing to some sort of chemical hostility on the part of the host to the grafted tissue.

An American physiologist, Guthrie,[1] performed the two-headed dog experiment in 1908 and succeeded in maintaining viability of the transplant for about two days, thus anticipating the much-publicized Russian experiment by some fifty years. Guthrie and Carrel made valuable observations with regard to the behavior of homogenous blood vessel transplants and established a solid foundation for the modern technic of vascular grafting.

The theory of acquired immunity was first formulated by Thomas Gibson, a Scottish plastic surgeon, and Peter Medawar, an English zoologist, in a paper entitled "The Fate of Skin Homografts in Man," published in 1943.[2] Medawar must be credited with popularizing and clarifying Gibson's hypothesis in the years that followed by a series of valuable experiments in association with Billingham and other investigators.

The important new conception in the paper by Gibson and Medawar was the fact that a second crop of cutaneous homotransplants from the same donor to the same recipient disintegrates at a faster rate than does the first, owing to an actively acquired immunity by the host against antigens from the first crop of homografts. If the interval of time between the first and the second crop of cutaneous homografts in man is eighty days or longer, hostile antibodies against the second crop apparently are absent; therefore, the second crop survives as long as did the first crop.[3] This hostile and specific antibody formation against homogenous skin grafts in man, therefore, is not of long duration, and during the time when it is active is not hostile to skin grafts from a different person.

It is generally supposed that the behavior of skin homografts indicates the behavior of other soft tissue homografts, such as endocrine gland and kidney. The cells in cartilage and the interstitial portion of cornea, however, are protected by an avascular matrix against hostile host cells. Host antibodies, undoubtedly, penetrate this matrix, but host cells do not gain entrance unless the matrix has been absorbed. If a homogenous corneal or cartilage graft becomes vascularized, host lymphocytes or other cells destroy the exposed cartilage and corneal cells as their protective matrix is removed. Thus, the term "cyto" antibody is used to designate an antibody contained in the host cell, in contradistinction to the "serum" antibody, which is in the serum outside the cell.

With these generalizations concerning factors that affect the survival of skin and cartilage homografts, it is now pertinent to review the conditions under which hostility on the part of the host may be circumvented or delayed, as well as the means of obtaining this result.

1. *Skin Grafts Applied to Patients With Deficiency Diseases.*—It has been known for some time that individuals with tissue deficiency may exhibit tolerance or relative tolerance to skin homografts. Thus, patients with agammaglobulinemia have no power to reject skin homografts or other tissue homografts, presumably because they cannot form antibodies.[4] Consequently, they are extremely susceptible to infection.

Persons with uremia and with severe burns show relative tolerance to skin homografts. Burned persons who are treated by homografting show a high level of urinary excertion of corticosteroids and

also a high blood level.[5] In animals, administration of cortisone and corticosteroids prolongs the survival of skin homografts.[6] In man, however, the administration of cortisone or corticosteroids in nontoxic dosages has failed to prolong the survival of the grafts. This suggests that the high blood level of corticosteroids in a burned patient is not the single factor responsible for the prolonged survival of skin homografts.

It is possible that *bacterial and other antigens* on the exposed burned surface afford such a barrage against the patient's immunologic system that it becomes exhausted and quite incapable of coping with antigens in skin homografts. As the burned surface heals or is successfully autografted, the smaller raw area admits fewer antigens, and the central immunologic mechanism of the patient recovers and rejects the homogenous skin.

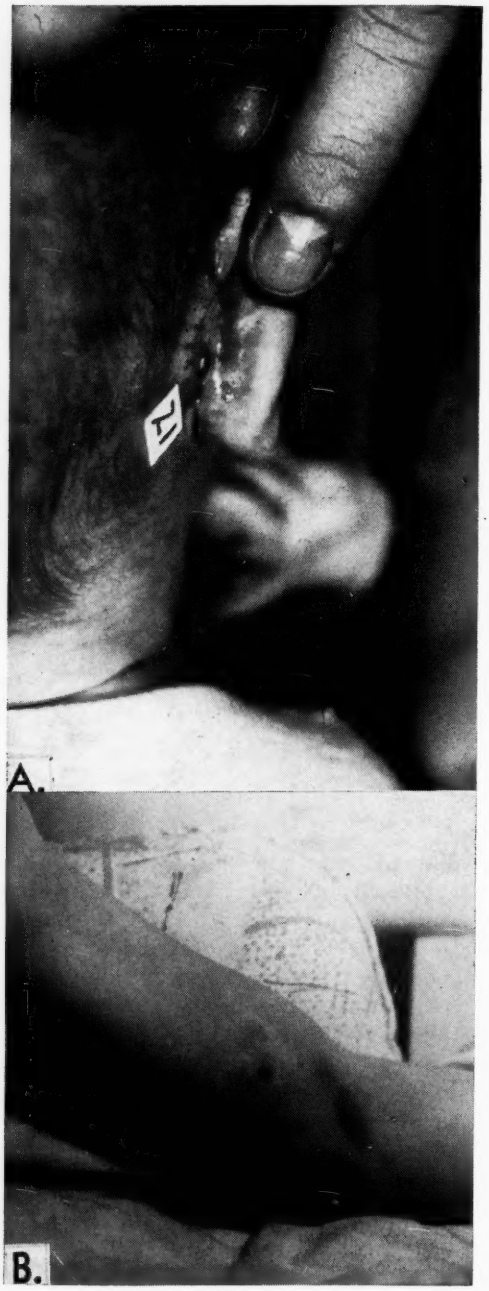
A patient under our care with bacteremia tolerated a full-thickness skin homograft perfectly until he died of a pulmonary abscess and generalized sepsis twenty-three days after application of the skin. This graft, examined microscopically with the surrounding host tissue, appeared like normal skin, with complete absence of infiltration by host cells. The central immunologic mechanism of this patient was possibly so much occupied with the antigenic barrage from the bacteria that it was incapable of any hostile action against the homogenous skin graft.

2. *Skin Grafts Exchanged Between Parents and Their Children.*—A series of 70 skin graft exchanges between parents and their children with compatible blood groups has demonstrated long survival of the skin transplants when the exchange was made between the mother and either a boy or a girl child.[7] All skin grafts exchanged between father and child, boy or girl, were rejected within fourteen days. The prolonged survival of skin grafts between mother and child occurred in about 25 per cent of the exchanges and was not dependent on blood types or the Rh factor, nor was it associated with a low gamma globulin level. Skin grafts from mother to child survived up to thirty months after transplantation, and grafts from children to mothers have been tolerated up to three years and have not yet been rejected. The longest surviving skin homografts on both mother and child occurred when the exchange was made between the mother and a boy infant or older child.

Fig. 1.—Prehistoric Peruvian skull with trephine opening closed by gold plate. Gold foreign body implant is elevated to show thin layer of new bone formation, which demonstrates that ancient Peruvian survived trephining operation. *(Photograph from collection of Dr. Jacob J. Longacre of Cincinnati, Ohio.)*

Prior intramuscular injection into the infant of fresh blood from the parent who

later donated skin did not prolong the survival of the skin grafts.



Biopsy demonstrated the survival of skin grafts exchanged between mothers and male children by the presence or absence of the female sex chromatin body in the epidermal cells of the transplants.

In the opinion of our Group, the longer survival of skin homografts from mother to child than from father to child may be caused by an exchange of cell substances (antigens?) between the mother and the fetus during pregnancy. This might lead to "acquired tolerance" in the sense indicated by Billingham and his collaborators.[9] There is also the possibility of some favorable genetic factor in mothers which is not present in fathers.

Dr. Blair Rogers, at the International Congress of Plastic Surgeons in London in 1959, presented the results of his animal experiments, which supported our human experimental observations to a surprising degree. Skin grafts were exchanged between unrelated (non-inbred strain) mother and father rats and their offspring. All of the grafts exchanged between the father rat and male or female offspring were rejected, the longer survival occurring with grafts of the offspring's skin on the father (longest period of survival, thirty-nine days). Contrariwise, a respectable percentage (25 per cent or more) of the skin grafts exchanged between the mother rat and the offspring had a long survival and were still viable up to two

Fig. 2 (*opposite*).—*A*, tolerated skin homograft from mother to ear of her son, twenty-one days after transplantation. Small excoriation resulted from punch biopsy, which demonstrated female sex chromatin marking in skin homograft. Graft continued to be tolerated and was removed eight months after transplantation for microscopic examination. Once again female sex chromatin markings were present in epidermal cells, indicating that homograft had survived. *B*, second skin homograft transplanted from mother to child's arm six months later. Photograph shows this tolerated skin homograft two and one half years after transplantation, at which time punch biopsy specimen was taken. Microscopic examination demonstrated female sex chromatin in epidermal cells.

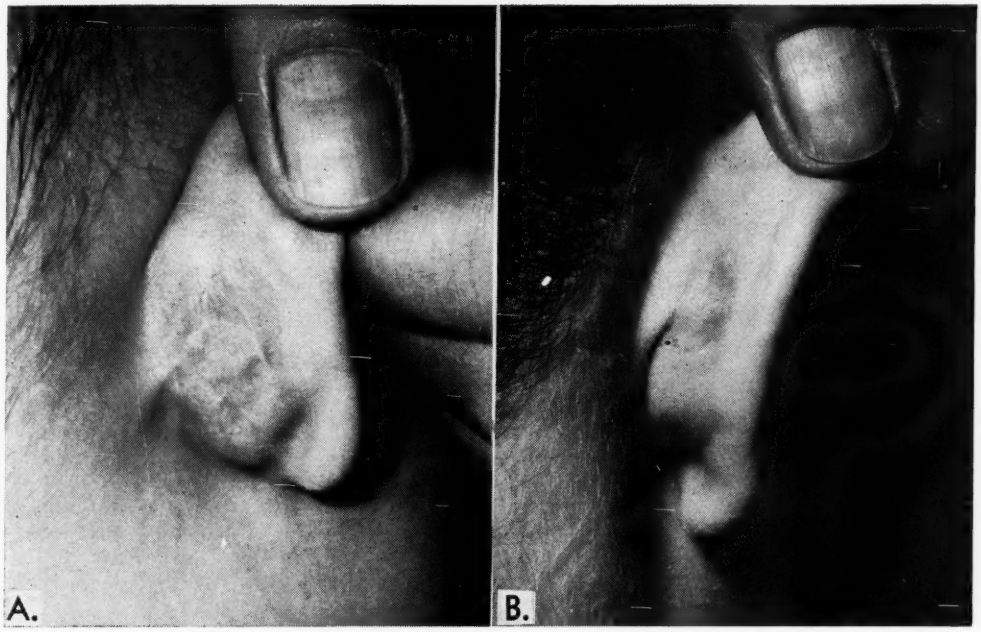


Fig. 3.—*A*, tolerated skin homograft from mother to ear of infant son, two years after transplantation. *B*, tolerated skin homograft from boy to ear of mother, two years after transplantation. About twenty-five per cent of skin exchanges between mothers and their children are tolerated, but skin exchanges between fathers and their children are rejected within fourteen days.

hundred and four days, when the rats were disposed of.

3. *Long Survival of Skin Homografts After Large Blood Transfusions.* — Prolonged survival of skin homografts in newborn infants has been achieved after exchange transfusions, according to Robert Fowler Jr. and his co-workers at the University of Cincinnati. These investigators found that two factors were required: (a) transfusion of fresh blood with living leukocytes rather than stored blood with dead white blood cells, and (b) the use of skin graft and blood from the same donor.

The grafts were applied to 12 infants who were given exchange transfusions for neonatal jaundice. Half of them were given fresh blood and grafts from the blood donors. For control purposes the other 6 were given stored blood with dead leukocytes and grafts from donors other than the persons who contributed the blood. Prolonged survival of skin homografts up to fifty-five and one hundred and fifty-seven days occurred in all infants given fresh blood taken from the skin donors. In sharp contrast, the 6 control skin homografts were rejected between the twelfth and the thirtieth postoperative day. The grafts that achieved long survivals, however, have undergone contracture and must be judged as "relatively tolerated," which indicates their eventual replacement by host skin.

4. *Skin Grafts During Pregnancy.*—It has been stated that pregnant women are tolerant of homogenous skin grafts. We have transplanted homogenous skin grafts to 4 pregnant women. In 3 of the cases skin was exchanged between the mother and one of her children who had congenital absence of one ear and, therefore, might require cartilage from the mother to con-

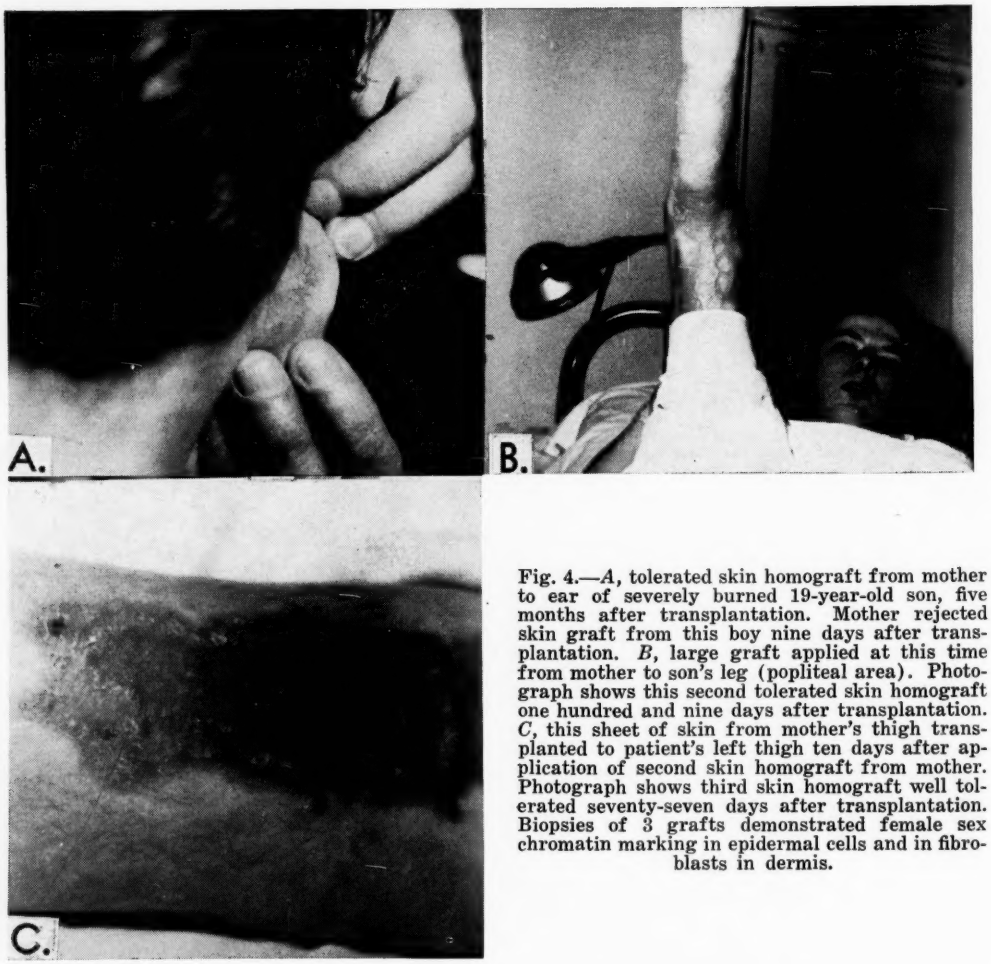


Fig. 4.—*A*, tolerated skin homograft from mother to ear of severely burned 19-year-old son, five months after transplantation. Mother rejected skin graft from this boy nine days after transplantation. *B*, large graft applied at this time from mother to son's leg (popliteal area). Photograph shows this second tolerated skin homograft one hundred and nine days after transplantation. *C*, this sheet of skin from mother's thigh transplanted to patient's left thigh ten days after application of second skin homograft from mother. Photograph shows third skin homograft well tolerated seventy-seven days after transplantation. Biopsies of 3 grafts demonstrated female sex chromatin marking in epidermal cells and in fibroblasts in dermis.

struct a replacement. In the remaining case, skin from an unrelated donor was transplanted behind the ear of the pregnant woman. In all of 4 cases the women were in the fifth or sixth month of pregnancy. The 3 skin homografts transplanted from pregnant women to their children and the graft from the unrelated donor were all rejected in nine to twelve days. All of the pregnant women, however, showed relative tolerance for their children's skin up to three months after transplantation, which was the time of the last examination. Observations have not been made to ascertain the fate of the skin homografts after the termination of their pregnancies.

Dr. Hector Marino, at the July 1959 meeting of the International Congress of Plastic Surgeons in London, presented an interesting account of his attempts to induce tolerance to skin homografts in animals by injecting an extract from pooled human placentas. His experiments have not been carried on long enough to determine the value of this treatment, but it is

a new and provocative avenue of approach.

Investigators appear to have neglected the fact that the developing embryo in a pregnant woman is a homograft. At any rate, it is a partial homograft, composed of substances from the father's sperm as well as from the mother's ovum. This embryo is protected, to be sure, by a clever arrangement of fetal membranes and a placenta that serves as a filter for maternal fluids. In addition to this, however, pregnant women secrete large amounts of corticosteroids, and these, in some animals, induce tolerance to homografts when the dose is large. The abundant production of corticosteroids, progesteron and other substances by pregnant women may represent nature's way of rendering pregnant women tolerant to their partly protected developing embryos.

Both infertility and consistent abortion, in some instances, may be early or late phenomena of the nature of homograft rejection. This possibility is indicated by the fact that some women married to fertile husbands fail to become pregnant, while if they are divorced and marry again they may conceive and deliver as many as six children. Their former husbands also, in a second marriage, may sire children from different wives.

5. *Tolerance of Skin Homografts in Patients with Carcinoma.*—Dr. Chester Southam[10] has carried out a group of experiments in which tumor tissue was transplanted. Two groups were used as recipients for the tumor grafts. One group consisted of prisoners who were considered normal and the other of patients with malignant disease. The results showed that patients with malignant disease tolerated the tumor transplant while the normal prisoners rejected it by the typical phenomena of homograft rejection.

Dr. Reuven Snyderman[11] repeated this work, using skin instead of tumor tissue as the homotransplant. Up to the time of writing he has transplanted 55 skin homografts* on patients with various malignant diseases. In 12 of this group, or 22 per cent, prolonged survival of the homografts has been observed. Three additional patients with chronic lymphatic leukemia were challenged with skin homografts. One of these patients showed the typical homograft rejection phenomena, while in the other 2 the survival of the homografts was prolonged.

In some patients with Hodgkin's disease, prolonged survival of skin homografts has been observed.[12]

6. *Tolerance of Fetal Skin Homografts.*—Dr. Helene Toolan[13] has carried out experiments in which she was able to show that rabbit fetal tissue taken from embryos of one-third gestation period or less survived permanently when transplanted to adult rabbits.

In man, skin grafts from embryos of one-half gestation period or less have been transplanted to adults with carcinoma.[11] Some of these fetal grafts have developed from their thin transparent state to a more mature type of skin in which hairs appeared.

Goldstein and Baxter,[14] however, transplanting fetal skin that was older than one-half gestation period, were unable to obtain notably prolonged survival of the homografts. They transplanted fetal skin homografts to patients who did not have carcinoma.

7. *Fresh Cartilage Homografts.*—The chondrocytes in fresh cartilage homografts survive as living cells after transplantation as long as they are surrounded by their protective armor of matrix. When the matrix is removed the cells are destroyed, presumably by cyto antibodies in lymphocytes or other invading host cells.

Evidence that the chondrocytes in fresh cartilage homografts remain viable is as

*Personal communication to the author.

follows: a. The cells in fresh cartilage homografts completely fill their lacunar spaces and take supravital dyes like living cells.[15] b. Chondrocytes in cartilage homografts metabolize radioactive Sulfur S^{35}, which is not metabolized by dead cartilage cells in preserved homografts.[16] c. The cells in fresh female cartilage homografts retain their characteristic sex chromatin after transplantation to male tissue.[17] d. Investigation of the metabolic activity of cartilage homografts indicates that the chondrocytes survive.[18]

Cartilage homografts would be as satisfactory as autografts were it not for the fact that host cells tend to remove the matrix of the homografts gradually and thus reduce the bulk of the cartilage transplant. The problem may be associated with tolerance to cartilage matrix or to antibody formation against antigens from the chondrocytes.

We are using exchanges of skin between mother and child for children born without external ears. In 2 cases in which children tolerated their mothers' skin, the mother's cartilage was used to construct an auricle. This fresh homogenous cartilage has shown no gross evidence of absorption for sixteen and twenty-four months, respectively, after transplantation. Two of our patients were challenged with skin and fresh cartilage homografts from the same donors. Acute rejection of the skin homografts in both cases did not grossly affect the cartilage grafts from the skin donors, although they were buried just beneath the rejected skin grafts.

Clinical Application of New Concepts of Skin and Cartilage Homografting. — The homograft problem is far from being solved, but considerable progress has been made. The newer research described in this paper suggests the following management:

1. Severely burned patients are generally tolerant of skin homografts. One of us (L. A. P.) has suggested that bacteria and other antigens on the exposed burned surface may produce such an overwhelming barrage against the patient's immunologic system that it becomes exhausted and unable to produce antibodies against antigens in an homogenous skin graft exhibited by a patient with bacteremia and generalized sepsis. Because of this tolerance of skin homografts, in severely burned patients, such patients should be treated with homografts. When the patient's condition is suitable, alternating strips of autogenous and homogenous skin may be applied to obtain a permanent as well as a temporary skin covering.

2. In cases of burning, the mother's skin should be used. She is a willing donor and may be in the 25 per cent in whom relative tolerance exists between mother and child. For elderly women, a son or a daughter should be considered in choosing a donor.

3. Fowler's observation has clinical significance, and prospective recipients of skin and other tissue homografts might be given fresh blood transfusions from the tissue donor to enhance tolerance. The amount of blood given should probably be fairly large. It would seem wise to use the mother as the donor of both blood and skin when blood group compatibility is present.

4. Fetal skin homografts are still in the experimental stage of development. There are technical difficulties in removing and applying fetal skin grafts, because of the thinness and friability of the delicate translucent tissue, especially in young fetuses. If future experimental work demonstrates, however, that fetal skin, one-half gestation age or younger, will differentiate into a suitable covering on a patient, without carcinoma, these fetal grafts may become valuable.

5. If exchanges of skin are to be used as tolerance tests for other tissues exchanged between mother and child, there is the probability that acute rejection would induce antibodies against the skin

and that these antibodies would be active for some eighty days against other tissues or organs, such as the kidney. After eighty days the hostile antibodies are said to disappear, and transplantation of a kidney would then be tolerated as well as it would be if the skin graft had not been applied and rejected. This interval, however, might not fit in with the immediate need of the patient for a functioning kidney.

6. No one knows what the effect of a relatively tolerable skin homograft would have on the survival of a kidney or other soft tissue homograft.

7. Skin homografts as a test for tolerance to cartilage from the skin donor are safe, since the antibodies formed against the skin cannot destroy cartilage cells surrounded by their armor of matrix. This may also apply to the cells in the interstitial portion of homogenous corneal grafts.

ZUSAMMENFASSUNG

Der Verfasser erörtert Hauttransplantationen und bespricht die Indikationen, die Form der Ausführung und das Lebenbleiben der Transplantate sowie ihr verschiedenes Verhalten je nach dem Typus des Patienten und der Art der zugrunde liegenden Erkrankung. Er beschreibt Ergebnisse und Aussichten von Hauttransplantaten zwischen Eltern und Kindern sowie den Einfluss von Bluttransfusionen auf die Lebensdauer des Transplantates. Er weist darauf hin, dass das Problem von Transplantaten innerhalb der gleichen Art noch bei weitem nicht gelöst ist, wenn auch erhebliche Fortschritte zur Klärung gemacht worden sind.

RÉSUMÉ

Les greffes cutanées, leurs indications, leurs applications et leur survie sont discutées, ainsi que leurs différences de comportement selon les divers types de malades et d'états pathologiques. L'auteur décrit également les résultats possibles des greffes cutanées entre parents et enfants, de même que l'influence de la transfusion sanguine sur la vie de la greffe. Il signale que les progrès réalisés sont considérables, malgré que le problème de l'homéogreffe soit encore loin d'être résolu.

RIASSUNTO

Vengono trattati i trapianti cutanei, la loro indicazione, la tecnica di applicazione e la loro sopravvivenza, come pure le varianti in rapporto ai diversi pazienti e alle diverse condizioni patologiche. Vengono descritti i risultati che si ottengono con trapianti cutanei scambiati fra genitori e gli effetti della trasfusione di sangue sulla vitalità dell'innesto. Il problema dell'omotrapianto, a detta dell'autore, è ancor lontano dall'essere risolto per quanto grandi progressi siano stati fatti in questo campo.

RESUMEN

En este trabajo se comentan los injertos cutáneos, sus indicaciones, su aplicación y supervivencia así como las variaciones en su comportamiento según los diferentes tipos de enfermos o condiciones patológicas. También se describen los resultados y probabilidades, en injertos cutáneos cuando usados entre padres e hijos así como la influencia de las transfusiones de sangre en la vida del injerto. Añade el autor que el problema de los homoinjertos está todavía muy lejos de solución pero que se ha hecho ya un progreso considerable.

SUMARIO

Enxertos de péle, suas indicações, aplicações e sobrevivência são discutidos, assim como seus comportamentos variados em relação a diferentes tipos de pacientes e condições patológicas. Os sucessos e os resultados prováveis de enxertos cutaneos entre pais e filhos são descritos, assim como a influência de transfusões sanguineas sôbre a vida do transplante. O problema homo-enxerto, é apontado como

longe de uma solução, tendo no entanto sido feitos consideráveis progressos.

REFERENCES

1. Guthrie, C. C.: Some Physiological Aspects of Blood Vessel Surgery, J.A.M.A. **51**:1658, 1908.

2. Gibson, T., and Medawar, P. B.: The Fate of Skin Homografts in Man, J. Anat. **77**:299, 1943.

3. Rapaport, F. T., and Converse, J. M.: Observations in Immunological Manifestations of the Homograft Rejection Phenomenon in Man, Ann. New York Acad. Sc. **64**:836, 1957.

4. Good, R. A., and Varco, R. L.: Successful Homograft of Skin in a Child with Agammaglobulinemia, J.A.M.A. **157**:713, 1955.

5. Hume, D. M.; Nelson, D. H., and Muller, D. W.: Blood and Urinary 17-Hydroxy-Corticosteroids in Patients with Severe Burns, Ann. Surg. **143**:316, 1956.

6. Billingham, R. D.; Krohn, P. L., and Medawar, P. B.: Effects of Cortisone on Survival of Skin Homografts in Rabbits, Brit. M. J. **1**:1157, 1951.

7. Peer, L. A.: Transplantation of Tissues. Baltimore: The Williams and Wilkins Company, 1959, vol. 2, chap. 1, p. 31.

8. Peer, L. A.: Behavior of Skin Grafts Interchanged Between Parents and Infants, Transpl. Bull. **4**:109, 1957.

9. Billingham, R. E.; Brent, L., and Medawar, P. B.: Actively Acquired Immunity, Tr. Roy. Soc. London (Series B.) **239**:357, 1956.

10. Southam, C. M.; Moore, A. E., and Rhoads, C. P.: Homotransplantation of Human Cell Lines, Science **125**:158, 1957.

11. Snyderman, R. K.: Prolonged Survival of Fetal and Adult Skin Homografts, Surg. Clin. North America **39**:501, 1959.

12. Kelly, W. D., and Varco, R. L.: Anergy and Skin Homograft Survival in Hodgkin's Disease, Surg., Gynec. & Obst. **107**:565, 1958.

13. Toolan, H.: Studies of Adult and Embryonic Skin Homografts on Conditioned or Normal Rabbits, with Emphasis on the Possible Role of the Ground Substances, Ann. New York Acad. Sc. **73**:546, 1958.

14. Goldstein, M., and Baxter, H.: Fetal Tissue Homografts, Ann. New York Acad. Sc. **73**:564, 1958.

15. Peer, L. A.: Transplantation of Tissues. Baltimore: The Williams and Wilkins Company, 1955, vol. 1, chap. 12, p. 101.

16. Schatten, W. E.; Bergenstal, D. M.; Kramer, W. M.; Swarm, R. L., and Siegel, S.: Biological Survival and Growth of Cartilage Grafts, Plast. & Reconst. Surg. **22**:11, 1958. Gibson, T.; Curran, R. C., and Davis, W. B.: The Survival of Living Homograft Cartilage in Man, Transpl. Bull. **4**:105, 1957. Craigmyle, M. B. L.: Studies of Cartilage Autografts and Homografts in the Rabbit, Brit. J. Plast. Surg. **8**:93, 1955.

17. Peer, L. A.: Sex Chromatin Study to Determine the Survival of Cartilage Homografts, Transpl. Bull. **5**:404, 1958.

18. Laskin, D. M., and Sarnat, B.: The Metabolism of Fresh Transplanted and Preserved Cartilage, Surg., Gynec. & Obst. **96**:493, 1953.

We often think of a famous scientist as if he had lived in splendid isolation, completely absorbed in the task of creation and discovery. We forget that beyond his worktable the whole world continued making history, and that he as a human being was influenced and moved by the ideas and forces that prevailed in his time. To understand Harvey's achievement, he must be looked at not as a lone figure but as one among the many who peopled the tapestry of seventeenth century England.

Just as one cannot appreciate the painstaking work that went into the making of an embroidered Chinese tunic unless one turns it inside out and observes the labyrinth of threads wherefrom emerged the exquisite dragons and lotuses on the right side, neither can one understand Harvey's achievement unless one knows something about the seething, turbulent London that was the reverse of Harvey's quiet, silent life of research and discovery.

—*Marti-Ibañez*

The Importance of Early Coverage in the Treatment of Burns

GILBERT L. HYROOP, M.D., F.I.C.S., D.A.B.

OKLAHOMA CITY, OKLAHOMA

WHEN the continuity of the skin is destroyed over a large area, a serious physiologic problem arises, which thus far has not been solved to the entire satisfaction of the profession. In a recent editorial[1] this statement appears: ". . . no injury is treated less expertly by the medical profession at large than the burn." Perhaps this is too severe an indictment, but, considering that about 70,000 persons are hospitalized each year for the treatment of burns, it seems important that current methods of treatment be reviewed from a critical standpoint.

Read at the Twenty-Fourth Annual Congress of the North American Federation, International College of Surgeons, Submitted for publication Dec. 29, 1959.

[1] Converse, J.: Surg. Clin. North America, 39:206, 1959.

The early coverage of third degree burns is advocated, using a systematic plan of débridement and skin grafting. Every possible method of making use of available skin for grafting should be taken advantage of. The early use of autografts and homografts, judiciously placed, enables one to close a burn in a relatively short time. In the débridement and skin grafting of burns, no hard and fast rules can be set as to the proper timing. The experienced surgeon will begin the débridement and skin grafting almost immediately, and will thus shorten the period of hospitalization, cut down on expense and produce better results.

Skin, and only the human being's own skin[2], is the sole covering for the human body that will "work." In the presence of an untreated third-degree burn, the sequence of events is as follows: an eschar develops, granulation tissue follows, and finally scar tissue is formed, the end result being contracture and deformity. To interrupt this sequence early by surgical intervention can be done in many cases when the burned area is limited to 15 to 20 per cent of the body surface. The burned tissue can be excised during the first few days by an experienced team of surgeons. Although there is usually a pronounced inflammatory reaction around the burned areas for nine to eighteen days, successful surgical excision can be done more frequently than it ordinarily is. Although the eschar is slow to separate and requires frequent dressings and soaks, surgical excisions can be performed carefully, with due regard to the patient's general condition.

Priority of Treatment.—A severe burn deserves priority over most types of surgical injury, both in the emergency room and in the operating room as treatment progresses. To insure adequate treatment for these emergencies, air-conditioned rooms are important. The personnel in charge must be well trained, and it is desirable that the burn be handled from the beginning by the surgeon who will carry the case through to completion of the reconstructive work. This is because the

[2] Except in the case of identical twins.

burn presents the problem of expert skin grafting and, in many cases, the use of flaps and pedicles, which must be planned from the beginning of treatment.

Time for Skin Grafting. — When the burns are extensive, all skin grafting cannot be done at one time, and it is necessary to decide which areas should be grafted first. Top priority should be given to the resurfacing of the hand, after which should come the eyelids, the face, the flexor creases of the neck and axilla, the area about the elbow joints, the knee joints and the groin (Fig. 1).

In patients whose general condition will permit, excision of the eschar of the hand and forearm can be carried out after about seventy-two hours, and a day or two later, if the wounds have been adequately débrided, skin grafts of 0.01 to 0.015 inch can be applied. Special plastic technics should be used in creases and clefts.

If the hand is not débrided within seventy-two hours, there is usually evidence of autolysis beneath the eschar on about the tenth to the fourteenth day.

Débridement is done in the operating room, with a tourniquet on the patient's arm. Careful dissection must be done over the proximal, middle and distal joints, so as not to remove viable tissue. A hand magnifying lens or a microscopic examination may be highly valuable in estimating the viability of tissue.

It is not uncommon to see unsightly small and even large scars on the faces of children and adults, where burned areas have been neglected, while consideration was given to larger burned areas elsewhere on the body. Regardless of the size of the burned area about the eyes, nose or face, since autolysis is present in about eight to ten days, skin grafting can be done frequently in twelve to fourteen days. Early skin grafting of the eyelids and the areas around the rim of the nose or the ears, frequently prevents severe disfigurement Ectropion of the eyelids can often be prevented by early débridement and skin grafting followed by tarsalorraphy.

Methods of Skin Grafting.—When large areas are to be resurfaced, it is necessary to take advantage of every possible method of utilizing the normal skin that is available for grafting. A large sheet of skin is preferable to several small sheets, if there are adequate donor areas. If there are not, other methods must be used. One method of covering a large denuded area economically is the use of very thin grafts (about 0.008 inch) in the shape of a postage stamp. If the principles of tissue transplantation are meticulously observed, it is possible to use such grafts to great advantage. Stamp grafts, placed so that the corners are touching, may be arranged in a single or a double chain across a flexor crease, or in contact with the normal skin on the periphery of the burned area (Fig. 2). Stamp grafts placed far apart and at random yield poor results, as the little islands of skin fail to proliferate and it becomes necessary to fill in the spaces between them with more skin, so that healing will be slow and the grafts will frequently become surrounded by hypertrophied scar tissue, producing an unsightly appearance. Chain grafts or grafts placed 0.5 cm. apart epithelize more quickly than do isolated grafts and result in a better appearance. Furthermore, by placing autografts in a localized area, one can easily fill in the rest of the wound with homografts, achieving complete coverage.

Dressings. — Postoperative dressing after skin grafting is usually begun on about the third or fourth day and must be carried out under aseptic conditions. The dressing of skin-grafted areas by inexperienced personnel should never be permitted, as it is easy to dislodge small grafts. In the severely burned patient,

skin-grafted areas and donor areas must be inspected at the time of each dressing for blebs, hematomas and infection. Strong antiseptics or ointments must be used with caution, as they may cause local reactions and lead to loss of the grafts. The donor sites must be covered with dressings to protect them from infection, so that they can be used again if necessary, usually in about three weeks. The layer of dressing immediately over a donor area is not removed until there is epithelization beneath it. When epithelization has taken place, the dressing can be removed with ease, usually in ten to fourteen days. The Owens dressing is an excellent one to use after surgical débridement and for covering the skin-grafted and donor areas, as it comes off easily and granulations do not proliferate in it.

Homografts. — Homografts, if obtainable, are of great value, when used in combination with autografts, for complete coverage. Their use is often a life-saving measure, since it controls the loss of body fluids and cuts down infection. Postmortem skin is preferred to skin from living donors. Often, however, it is very difficult to obtain when needed. The hospital personnel is rarely aware of this need, and it might be well to make a point of stressing the importance of obtaining permission to take postmortem homografts. Fresh postmortem grafts take best, and should be used if available.

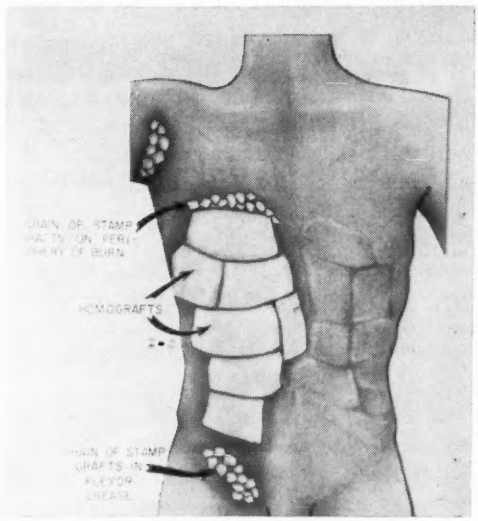


Fig. 2.—Chain of stamp grafts placed across creases of groin and arm; also, method of combination of such grafts with homografts. Stamp grafts are placed at periphery of extensive burn treated by homografting.

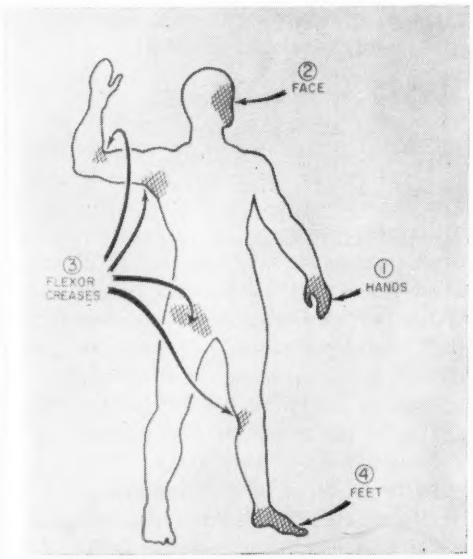


Fig. 1.—Areas for early skin grafting, in order of importance. These take precedence over grafting of flat surfaces.

The donation of postmortem corneal tissue has been given tremendous publicity in the press, while the need for postmortem skin for grafting is rarely mentioned. A campaign to inform the public regarding the life-saving value of postmortem skin might result in the donation of skin, just as we obtain donations of corneal tissue. This will become even more important, if we ever find methods of getting homografts to take permanently.

The treatment of the severely burned patient for shock and the stabilizing of fluid

and electrolyte balance has not been touched on in this paper, nor has the use of antibiotics been discussed, although these factors cannot be lost sight of as long as the patient is under treatment. It may be mentioned, however, that the use of 4 per cent urea in 10 per cent dextrose, when the output of urine is not adequate, will increase the amount excreted and will make the stabilizing of the fluids and electrolytes much easier. This is often a life-saving measure.

ZUSAMMENFASSUNG

Der Verfasser tritt für frühzeitige Versorgung von Verbrennungen dritten Grades ein und empfiehlt ein systematisches Verfahren der Wundtoilette und Hauttransplantation. Jedes Verfahren, das die Verwendung verfügbarer Haut zur Transplantation gestattet, muss herangezogen werden. Durch frühzeitige verständnisvolle Anlegung von Transplantaten vom gleichen Körper oder von der gleichen Art lässt sich eine Brandwunde in verhältnismässig kurzer Zeit schliessen. Was den geeigneten Zeitpunkt der Wundtoilette und der Hauttransplantation bei Brandverletzungen betrifft, so lassen sich keine strengen und unbeugsamen Regeln aufstellen. Der erfahrene Chirurg beginnt mit der Wundtoilette und der Hauttransplantierung fast unverzüglich und verkürzt auf diese Weise den Krankenhausaufenthalt, verringert die Unkosten und erzielt bessere Resultate.

RÉSUMÉ

L'auteur recommande le recouvrement précoce des brûlures du 3e degré et présente un plan systématique de débridement et de greffe cutanée. Toute méthode possible d'utilisation de peau disponsible en vue de greffes devrait être envisagée. Les autogreffes et les homéogreffes placées judicieusement permettent la fermeture d'une brûlure au bout d'un temps relativement court. Aucune règle rigide ne peut être établie quant au plan de débridement et de greffe en cas de brûlure. Le chirurgien expérimenté commencera le débridement et la greffe cutanée presque immédiatement, obtenant ainsi de meilleurs résultats tout en raccourdissant la durée de l'hospitalisation et en diminuant les frais.

RIASSUNTO

Viene raccomandato di coprire precocemente le ustioni di terzo grado e viene consigliato un piano sistematico di sbrigliamento e di successivo trapianto cutaneo. Si deve trarre vantaggio da ogni possibile metodo di prelievo cutaneo per uso di trapianto. L'innesto precoce di auto- o omotrapianti, messi giudiziosamente, rende possibile chiudere le ustioni in un periodo di tempo relativamente breve. Nello sbrigliamento e nel trapianto delle ustioni nulla è più importante della scelta del tempo opportuno. Il chirurgo di esperienza deve iniziare entrambe le cose quasi immediatamente, rendendo così più breve il periodo di ospitalizzazione, raducendo le spese e migliorando i risultati.

SUMARIO

O autor difunde a orientação de cobertura precoce de queimaduras de 3° gráu e decomenda um plano sistemático de debridamento e enxertia cutanea. Deve-se tirar vantagens de todos os métodos que tornam possível a obtenção de péle viável. O uso precoce de auto e homo-enxertos, judiciosamente colocados, permite o fechamento de uma ferida em um tempo relativamente curto. No debridamento e enxertia de queimaduras, não existem regras rígidas quanto a exata época. O cirurgião experiente iniciará d debridamento e enxertia cutanea imediatamente, encurtando assim o período de hospitalisação, diminuindo as despesas e produzindo melhores resultados.

RESUMEN

Aconseja el autor y expone un plan de recubrimiento precoz de las quemaduras de tercer grado con desbridamiento y aplicación de injertos cutáneos. Debe aprovecharse cada método posible de ser utilizado para poder disponer de injertos de piel. El empleo precoz de auto y hemoinjertos, aplicados acertadamente, permite curar una quemadura en un tiepo relativamente corto. Pero todo ello requiere hacer las cosas sin precipitación. El cirujano experimentado comenzará por desbridar e injertar la piel inmediatamente, y con ello acortará el tiempo de hospitalización, reducirá gastos y mejorará los resultados.

BIBLIOGRAPHY

Artz, C. P., and others: Post Mortem Skin Homografts in the Treatment of Extensive Burns, Arch. Surg. **71**:682-697, 1955.

Brown, J. B., and Fryer, M. P.: Postmortem Homografts to Reduce Mortality in Extensive Burns, J.A.M.A. **156**:1163-1166, 1954.

Dupertuis, S. M.: An Evaluation of Skin Grafts for Hand Coverages, J. Bone & Joint Surg. **34A**:811-818, 1952.

Elliott, J. L., and Grow, J. L.: Paper-Backed Postage Stamp Skin Grafts in the Treatment of Burns, Surgery **37**:823-828, 1955.

Hardy, S. B.: Dermatome Pliofilm Stamp Grafts, Am. & J. Surg. **92**:107-114, 1956.

Hitchcock, C. H., and Horowitz, S.: Therapy of Severely Burned Patients, Arch. Surg., April 1957.

Kiehn, C. L.: Late Treatment of Burns, Postgrad. Med. **20**:232-236, 1956.

Lewis, G. K.: The Use of the Patch Graft in Extensive Skin Loss, Plast. & Reconst. Surg. **12**:116-122, 1953.

MacMillan, B. G.: Early Excision of More than Twenty-five per cent of Body Surface in the Extensively Burned Patient, Arch. Surg. **77** (September) 1958.

Robertson, D. C.: The Management of the Burned Hand, J. Bone & Joint Surg. **40** (June) 1958.

Segnitz, R. H.: Burn Therapy in Infancy and Childhood, Gen. Practitioner, May 1938.

Smith, R. S.: Surgical Management of the Severely Burned Child, J.A.M.A. **164**:511-516, 1957.

Webster, G. V., and others: Dermal Overgrafting of the Leg, J. Bone & Joint. Surg. **40A** (July) 1958.

Whittaker, A. H.: Treatment of Burns by Excision and Immediate Skin Grafting, Am. J. Surg., March 1938, pp. 411-417.

Wynn, S. K.: Lower Extremity Skin Coverage in Children, J.A.M.A. **168** (Sept. 13) 1958.

Thought and decision are contrasted, as if they were incompatible. The implied corollary, that where the two are found apart, decision is the more essential to success, is probably true. When the curtain falls on the last act, Hamlet, the irresolute philosopher, is dead and discredited, and Fortinbras, the brainless man of action, holds the stage alone. But both qualities are necessary; and as the world passes from being a jungle which must be hewn and remade, to the condition of an estate which must be planned and cultivated, the less important become quick instinctive decisions and forceful acts, the more important the weighing of alternatives and the planning of considered policies, the examining of the distant no less than the immediate consequences of action.

—*Ogilvie*

Benign Adenomas of the Colon and Rectum

ROBERT PARK JR., M.D., F.I.C.S.

GARDEN CITY, NEW YORK

A PARTICULAR observation in a series of cases of adenoma of the rectum and colon was the paucity of symptoms that can definitely be attributed to the adenoma *per se*. A majority of the patients had concomitant disease that fortunately produced the presenting symptoms. In fewer than 50 per cent of the cases were the symptoms definitely related to the adenoma. Questionable symptoms or other disorders that were producing symptoms were not included. Lesions under 5 mm. in diameter were rarely observed. As in all other reported series, the vast majority of patients complained of bleeding as the initial or provocative sign. Protrusion, mucus, cramps or change in bowel habit notified the patient of some abnormality in approximately equal number of cases.

Submitted for publication Feb. 5, 1960.

The author points out that the symptoms do not provide a reliable index of the presence of adenoma. The sex ratio is approximately 2:1 in favor of the male, a predominance that continues over a considerable span of years.

Juvenile polyps, which may occur in persons ranging in age to the early twenties, are not true adenomas.

Certain adenomas, according to current evidence, are precursors of carcinoma. It is impossible, at the present level of cytologic knowledge, to determine which types are likely to undergo malignant change.

No relation could be postulated as to the location or size of the adenoma as against the age of the patient. Apparently the number of persons examined between 40 and 60 years of age has increased, so that smaller growths are identified oftener than in previous series. The overall percentage of adenomatous lesions detected by sigmoidoscopic study was 7.5 per cent; this figure compares favorably with the national average.[1]

Determining the location of the adenomas by dividing the rectal wall into quadrants resulted in an interesting observation. The anterior wall was the most frequent location. The posterior wall was the site of approximately 20 per cent of the lesions, whereas both lateral walls accounted for 21 per cent of the total. In 21.5 per cent of the cases there were multiple lesions. Multiple polyps occur more frequently than is generally appreciated.[2]

Age and sex distribution was revealing. The male patients outnumbered the females,[3] males accounting for 65 per cent of the cases even though the ratio of the "patient load," both male and female, varied only 2 to 4 per cent either way yearly. As to incidence according to age levels, the

critical plateau appeared between the ages of 40 and 50. This remained elevated through the age of 55 and then dropped to about one half through the age of 70. Relatively, the male incidence remained very high in patients up to and including the age of 65. For patients from 66 to 70 the incidence was approximately equal in the sexes. In children aged 1 to 5 years there were twice as many boys as there were girls. Minimal equivocal figures occurred in both sexes between 6 and 24 years of age. From 30 to 45, women were five years behind men in the upward trend, then remained practically level for the next ten years, while the male incidence was still climbing. The incidence declined to approximate equality at the age of 70.

It is readily deduced from this analysis that men have a much longer "potential" for new growths in the rectum and colon than have women. Male hormonal activity must account for this increase and could be the basis for further research on this problem.

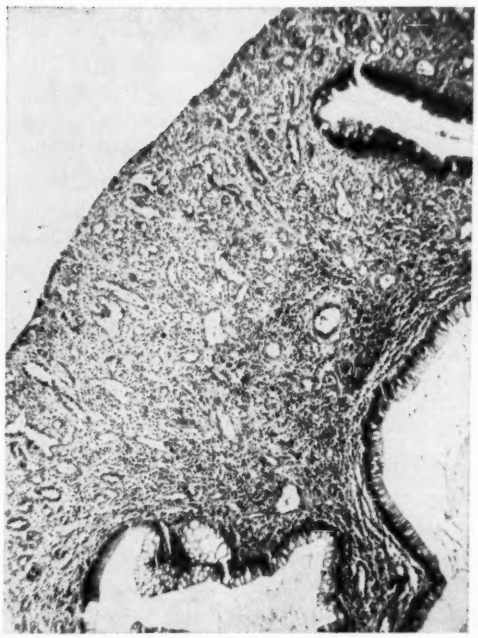


Fig. 2.—Case of D. P., girl 3 years old. Typical "juvenile" polyp. Diagnosis: ulcerating angioma.

g. 1.—Case of M. D., woman aged 68. Polypoid mor arising from anorectal line. Stalk conned fibroadipose connective tissue lined with atified squamous epithelium. Body of tumor s made up of acini lined with tall columnar epithelium, indicating benign adenoma.

As to the distance of the lesion from the anal verge, the majority of adenomas were between 10 and 15 cm. therefrom, with the peak at 12 cm. Although the posterior rectal wall is more difficult to examine with the patient in the knee-chest position, diligent search must be made for minute lesions just above or arising at the anorectal line (Fig. 1).

A disturbing observation in those who returned for follow-up was the fact that 42 per cent revealed recurrence at the previous site or a new lesion, or both. The great majority showed recurrence or new lesions during the first two years of follow-up. Two patients in the series, however, re-

vealed the first new lesion seven years after the original examination.

In a series of 500 cases with diagnoses of benign adenoma of the colon or rectum, an additional diagnosis of adenocarcinoma was made in 11, and on subsequent follow-up, 4 patients had adenocarcinomas.[4] One of these appeared at the site of an adenoma for which a biopsy specimen had been taken and fulguration to the point of destruction had been done seventeen months before. Mayo[5] and de Castro reported a case of carcinoma of the sigmoid arising from a polyp first visualized roentgenologically fifteen years earlier.

An unexplained phenomenon is the fact that malignant change takes pläce in one adenoma and not in another, although adjacent thereto and subjected apparently to the same hormonal or irritant factor. I have resected a sigmoid colon with a 1 cm. adenocarcimona in the same segment with a 2 cm. benign adenoma.[6] Welch and his collaborators stated that 20 per cent of carcinomas of the colon and rectum are associated with adenomatous polyps.

The gross appearance of polyps in children is not typical of adenomas in adults, and this also applies to the microscopic sections. Granulomatoid tissue is present on the surface, and the mucous membrane is slightly changed. There are different degrees of maturity of the connective tissue. The stroma is predominantly infiltrated with eosinophils and leukocytes. The pathologist confirms this by summarizing his reports thus: "Lesion looks more inflammatory than neoplastic." De Veer described these lesions as resembling granuloma pyogenica, on the basis of their appearance and behavior. Ulcerations are frequently present on the surface. The cells in the glands have very good polarity, and all are functioning and secreting (Fig. 2). Children rarely present multiple lesions, and recurrence is also rare. If this occurs, multiple polyposis should be considered. In 1 boy 2 years of age both recurrence and a new lesion occurred in nine months after removal of a benign adenomatous polyp of the rectum. This patient will bear watching. The crux of the matter would be whether the proclivity toward the development of adenomas extends into adulthood; this would also mean premalignant change, which thus far has not been observed. Other authors[9,10] have a similar impression with regard to the juvenile "adenoma." The comparative histopathologic differences between juvenile polyps and adult adenomas extend even into patients 16 to 25 years old. At the age of 26 the true adenoma appears, and there is no evidence of transition from one to the other.

A good sign in the field of colorectal disease is the increasing interest manifested by general practitioners and internists in complete proctologic study of the patient. This should bear much fruit in the early discovery of potentially serious lesions.

ZUSAMMENFASSUNG

Klinische Symptome geben keinen zuverlässigen Hinweis auf das Vorliegen einer Drüsengeschwulst.

Adenome kommen bei Männern etwa zweimal so häufig vor als bei Frauen und werden bei Männern über eine grössere Lebensspanne beobachtet.

Polypen bei Jugendlichen sind keine echten Adenome. Sie treten bei Menschen bis zum Alter in den frühen zwanziger Jahren auf.

Es gibt noch immer Gründe anzunehmen, dass gewisse Drüsengeschwülste Vorläufer von Krebsen sind. Es ist aber bei dem heutigen Stande unserer zytologischen Kenntnisse unmöglich festzustellen, welche Form des Adenoms Wahrscheinlichkeiten bösartiger Entwicklung in sich trägt.

RÉSUMÉ

Les symptômes ne sont pas un signe d'indication sûr pour le diagnostic de l'adénome.

La fréquence de l'adénome prédomine chez l'homme dans la proportion d'environ 2 contre 1 par rapport à la femme et continue à se manifester pendant un temps plus long.

Les polypes juvéniles ne sont pas de véritables adénomes. Ils apparaissent jusqu'à lâge de 20 ans.

Il est établi que certains adénomes sont précurseurs de carcinomes. En l'état actuel de nos connaissances cytologiques il est encore impossible de déterminer les types d'adénomes susceptibles de dégénérescence maligne.

RIASSUNTO

I sintomi non sempre sono un segno attendibile di adenoma. Questi tumori predominano nel sesso maschile con una proporzione del 2 a 1 e sono molto più durevoli nel temp.

I polipi giovanili non sono adenomi veri; questi si presentano in soggetti di oltre venti anni.

Vi sono elementi per affermare che gli adenomi sono talvolta precursori del carcinoma. Non è possibile, tuttavia, stabilire—allo stato attuale delle conoscenze, quale tipo istologico sia più portato a trasformarsi in cancro.

RESUMEN

En presencia de un adenoma los síntomas no constituyen un índice exacto. La frecuencia del adenoma en el hombre predomina aproximadamente sobre el de la mujer en proporción de 2 a 1 y continúa durante un número mayor de años.

Los pólipos juevniles no son verdaderos hematomas. Se presentan en sujetos por debajo de los 20 años. Existe evidencia de que ciertos adenomas sean precursores del carcinoma. En el presente estado de conocimientos citológicos no es posible determinar qué tipo de adenoma es precursor del carcinoma.

SUMARIO

Os sintomas não são um índice de confiança na presença do adenoma.

A incidência masculina dos adenomas predomina aproximadamente na relação de 2 para 1 em relação ao sexo femenino e continua sôbre um grande número de anos.

Polipos juvenis não são adenomas verdadeiros. Aparecem em pessoas acima dos vinte anos de idade.

Ainda existe evidência que certos adenomas são precurssores de carcinomas. No estado atual de conhecimento citológico não é possivel determinar-se quais os tipos que podem tornar-se malignos.

REFERENCES

1. Hayes, H. T., and Burr, H. B.: Adenomas of the Rectum and Colon: Surgical Management, Internat. Coll. Surgeons 1:56 (Jan.) 1955.
2. McLanahan, S., and Martin, R. E.: Colotomy, Coloscopy and Colectomy in the Management of Polyps of the Large Intestine, Ann. Surg. 145:689-698 (May) 1957.
3. Wilson, G. S.: Evaluation of Sigmoidoscopic Examination, Am. J. Surg. 90:855 (Nov.) 1955.
4. Bacon, H. E., Laurens, J., and Peale, A. R.: Histopathology and Relation Between Adenoma and Carcinoma, Surgeons 29:663 (May) 1951.
5. Mayo, C. W., and de Castro, C. A.: Carcinoma of Sigmoid Arising from a Polyp, First Visualized 15 Years Previously: Report of Case, Proc. Staff Meet. Mayo Clin. 31:597 (Oct.) 1956.
6. Fansler, W. A., and Neumeister, C. A.: Precancerous Lesions of the Rectum and Colon, Journal-Lancet 76:258 (Sept.) 1956.
7. Welch, C. E.; McKittrick, J. B., and Behringer, G.: Polyps of the Rectum and Colon and Their Relation to Cancer, New England J. Med. 247:959 (Dec.) 1952.
8. De Veer, J. A.: Personal communication.
9. Turell, R., and Maynard, A. L.: Adenomas of the Rectum and Colon in Juvenile Patients, J.A.M.A. 161:57 (May 5) 1956. Mauro, J., and Prior, J. T.: Gastrointestinal Polypoid Lesions in Childhood, Cancer 10:131, 1957.

Neuroplegia and Hypothermia in the Management of Surgical Thyrotoxicosis

A. BOBBIO, M.D., F.I.C.S., P. GOFFRINI, M.D., E. BEZZI, M.D.
AND
G. ULERI, M.D.
PARMA, ITALY

SINCE 1952, when we first started to apply artificial hibernation (i.e., body cooling associated with pharmacologically induced neuroplegia) to the treatment of postoperative disease, we had hypothesized its possible role in reducing the incretory rate of the thyroid gland and, consequently, its suitability to the treatment of thyrotoxicosis.[1]

In fact, though hyperthyroidism is doubtless the most evident feature of the latter condition, the basic pathogenic factor is widely accepted to be adrenergic hyperactivity of the whole neurovegetative and ductless glands system; with other, nonthyroid symptoms (hormonal; metabolic; circulatory; neurovegetative, and even neuropsychic) contributing to the clinical picture in the individual case.

Sudden thyroxine-TSH imbalance, as caused by a sharp reduction of thyroxinemia, has been suggested as the determining factor of postoperative or postradiation toxic crisis. But, apart from operation and irradiation, either chronic or acutely worsening thyrotoxicosis, up to a critical outburst, is usually observed in the absence of such a specific mechanism as the one suggested. For instance, a syndrome resembling clinical thyrotoxicosis can be observed after nonspecific stimulation to the hypophysis to hyperfunction (Selye); and exhaustion of the adrenal glands has been emphasized as a prominent feature of thyrotoxic crisis itself (McArthur; Moseley; Reiss).

In other words, thyrotoxicosis could be more properly defined as an abnormal and falsely balanced state of endocrine equilibrium, highly expensive as well as highly unstable by which the whole organism is driven at a very high biologic rate, so that a dangerous imbalance can be induced at any moment by a stressful agent of any significance, such as exertion, worry, illness, operation or irradiation.

From the University Surgical Clinic, University of Parma, Italy, directed by Prof. Antonio Bobbio.
Submitted for publication Feb. 16, 1960.

Clinically as well as theoretically, in the authors' hands, controlled hypothermia has proved effective in the management of thyrotoxicosis. The rationale of its use and the mode of its action are described, with emphasis on adaptation of the technic to the individual case. Reports of four illustrative cases are included.

Accordingly, surgical stress as induced by thyroidectomy for toxic goiter appears particularly liable to association with postoperative crisis, both as a nonspecific aggression to an overworked homeostasic apparatus and as a more specific disturbance to thyrohypophysial interregulation. On this account, the old terms "vegetative storm," "orage néuro-végétatif" and the like happily suggested both the severity and the nonspecificity of postoperative thyrotoxic crisis.

To anyone who had taken an interest in the theoretical and practical aspects of hypothermia, therefore, it was easily suggested that such a treatment would be suitable surgical thyrotoxicosis, for the following reasons:

1. It would insure a general effect of sedation, as has been widely demonstrated by both experimental and clinical results of our own and others' work. It emphasized that, entirely apart from neurologic and ganglioplegic drugs, low temperature alone causes a functional blocking of incretion (hypophysis, thyroid, adrenals) and of ganglionic conduction.

2. It would insure a more economical metabolic rate throughout the body metabolism.

3. Particularly, it would induce a slowing down of thyroid activity, thus interrupting a main feature of the morbid physiologic state associated with this syndrome.

As for the last-mentioned reason, we referred to the experimental results obtained by Goffrini and his co-workers[2]. In the guinea pig, the thyroid uptake of radioactive iodine, as measured by a counter after intraperitoneal injection, was evaluated (1) in untreated animals; (2) after injection of a neuroplegic cocktail; (3) during body cooling, and (4) after neuroplegia *and* body cooling.

On comparison of the uptake values (see table) the following facts were apparent:

In untreated animals, uptake reached its maximum within twelve hours, after which dismissal began.

In animals (1 series) subjected to body refrigeration (placed in the cooling compartment of a refrigerator), the maximum uptake was more or less like that obtained in the first group, except that it was reached later, i.e., within twenty-four hours, after which slow dismissal began.

In animals (2 series) treated with varying doses of neuroplegic cocktail (procaine, phargan, chlorpromazine, Diethazine, Pethidine) and curare, the rate of uptake and the maximum values were sensibly raised, as compared with the control series, during all phases of counting.

In animals (1 series) treated by both neuroplegia and refrigeration, the rate of uptake and the values were sharply reduced and remained steadily lower than those of the controls until cooling was discontinued.

Values of Thyroid Uptake of I^{131} Expressed as Per Cent of Impulses from Total Doses (5 Microcuries)

			Hours After Injection of I^{131}			
	5		*7*	*12*	*24*	*48*
Untreated			17.6%	21.2%	21 %	19.8%
Refrigeration	16.8		17.5%	19.8%	21.2%	20.4%
Neuroplegia	to	treatment	18.4%	20.1%	23.2%	23.1%
	17.2%		21.2%	24.1%	28.2%	25.4%
Refrigeration and neuroplegia			15.8%	16.2%	17.5%	22.4%

Interpretation of the uptake tracing was rather difficult, particularly as to the meaning of the increase in uptake rate and maximum values after neuroplegia alone; it has been hypothesized that pharmacologic blocking alone, in the case concerned, frees the thyroid gland from its diencephalic restraining regulators. In this connection it must be remembered that diencephalic diseases with thyroid involvement not seldom induce hyperthyreosis, while infundibulohypophysial lesions more usually induce hypothyreosis.

Changes in iodine uptake like those induced by body cooling alone are easier to interpret: an increase of thyroid function as a whole is, in fact, to be expected as a response, both nonspecific and thermoregulative, to aggression by cold.

In the animals treated by neuroplegia and hypothermia, however, this response was blocked, as was expected, and thyroid function was slowed down, as was the overall biologic rate of the organism, in accordance with the lowering of tissue temperature.

Histologic studies by Cahn and his coworkers confirmed these results by demonstrating that neuroplegia and hypothermia induce a morphologic type of functional rest of the thyroid gland.

On these bases, therefore, a system of preoperative management of all cases involving operation on the thyroid for toxic goiter has been established in our clinic, consisting in vegetative sedation induced by neuroplegic and ganglioplegic drugs* in combination with the more familiar sedative drugs, such as barbiturates, rauwolfia alkaloids and bromides, and with Plummer's iodine-iodide solution. Body cooling is reserved for cases in which the toxic symptoms were acutely worsening, as will be described later.

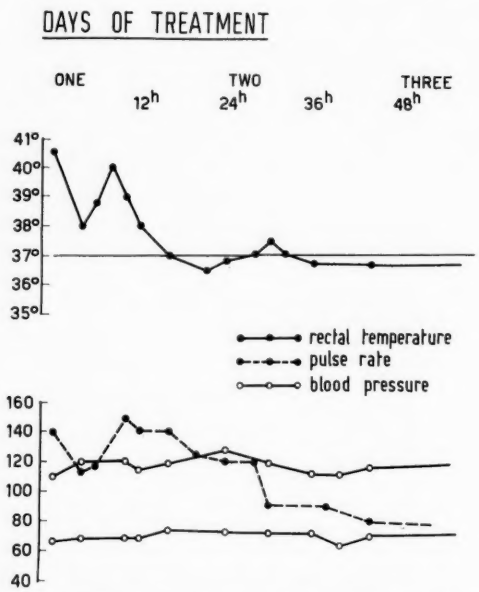


Fig. 1.—G. M., aged 48. Toxic nodular goiter, treated by thyroidectomy. General hypothermia for postoperative thyrotoxic crisis. First attempt to induce hypothermia while patient was awakening from surgical anesthesia had to be given up on account of severe resistance to cooling (intense shivering, cyanosis, tachycardia). Second attempt, made after a sounder neuroplegia and curare, treatment was successful, bringing rectal temperature down to 37-36.8 C. Treatment suspended after thirty-six hours. Recovery thereafter uneventful.

The results of vegetative treatment were, on the whole, satisfactory, except for 4 cases in which more or less severe postoperative imbalance, on a thyrotoxic basis followed. In cases 1 and 2 (not here reported in detail) the signs of toxicosis were rather mild, consisting in moderate hyperthermia temperature (39 to 39.5 C), tachycardia (pulse rate 115 to 130), restlessness and dyspnea. Pharmacologic treatment as described, was continued for thirty-six hours and three days respectively, after which the symptoms subsided and uneventful recovery took place.

*Procaine	1-2	Gm.	i.v. drip (60-80 per minute),
Pethidine	0.1	Gm.	2-3 times daily
Chlorpromazine	0.1	Gm.	
Dextrose glucose (5% sol.)	1,000	ml.	
Phargan	0.05-0.1	Gm.	i.m., 3-4 times daily
Atropine	1	mg.	2-3 times daily
Hydergine	0.3	mg.	1-2 times daily

CASE 3.—In the third case conditions were far worse;[3] In a woman aged 48, who had been well until four years earlier, a nodular goiter had developed, with exophthalmus, profuse sweating, restlessness, tachycardia and loss of weight. The menopause intervened at the age of 45. For a few months prior to admission, she had also accessional dyspnea and, occasionally, dysphagia. On admission the patient, a poorly nourished, underweight woman, presented the clinical picture that has been described. She was very anxious and restless, sweating profusely, her head and hands shaking. The pulse rate was more than 150 per minute (electrocardiogram: sinusal tachycardia). Examination of the blood showed discrete anemia and hypoproteinemia. The basal metabolic rate was high (plus 40 per cent), but its measurement was not wholly reliable because of displacement of the trachea and the consequent hindrance to breathing.

Routine preoperative treatment was undertaken, with fairly good results, but six days later the occasional dyspnea became worse and worse, and with it appeared the neurologic and circulatory symptoms of toxicosis. An "emergency" thyroidectomy was decided upon and performed, with the patient under general anesthesia. Waking was complicated by respiratory obstruction, from partial tracheal collapse, and accidental "swallowing" of the tongue, which was settled by butting in place a pharyngeal airway, analeptic drugs (pycrotoxin) and oxygen therapy. But worrying symptoms of toxicosis were, in the meantime, established: tachycardia (134 to 140), hyperthermia (40.6-40.8) and deep coma. Neuroplegic drip was resumed and cooling induced by distribution of icebags all over the body. A basic rectal temperature of 38 C was obtained very slowly (more than four hours) during which intense shivering, cyanosis, tachycardia and delirium occurred. The icebags had to be removed and neuroplegic drugs and curare injected; refrigeration was resumed and well tolerated, bringing rectal temperature slowly down to 37-36.8 C, at which level it remained steadily thereafter (see diagram).

The heart rate was returned to a reassuring level with greater difficulty. Hydroquinidine (0.3 gr.) had to be injected every twelve hours. Only after forty hours of treatment it was steadily reestablished at the rate of 75 to 90 per minute. Coma subsided when the rectal temperature became stabilized below 38 C (fifteenth hour). The blood pressure was never substantially altered, since the anoxemic collapse had been overcome.

The icebags were finally removed after twenty-eight hours of body cooling, and neuroplegic treatment alone was maintained, until the fourth day, after which, uneventful recovery took place: the patient left hospital on the ninth day after the operation.

Comment.—This case suggests several considerations: first of all, that a toxic postoperative crisis was to be expected, according to the preoperative course; in fact, thyrotoxic symptoms did not subside under adequate treatment, and operation had to be performed notwithstanding the patient's condition. The environmental temperature (it was a very hot summer) together with the obstructive dyspnea, made the patient a poor surgical risk indeed. Operation had to be performed as an "emergency" in an attempt to interrupt the worsening of the syndrome, since the patient's best chances lay in thyroidectomy.

Perhaps, too, a fault may be recognized —the delay of induction of hypothermia until the toxic crisis in all its severity had been established. As a consequence, it was particularly difficult to reduce the body temperature, which was eventually accomplished with an impressive reaction. Cooling had first to be discontinued for a while and could be resumed only when vegetative blocking had been reestablished more accurately by heavy pharmacologic neuroplegia. On the other hand, hypothermia, once established, was promptly effective in reducing the symptoms of toxicosis: as soon as the rectal temperature fell below 37 C, tissue oxygenation, neuropsychic balance, pulse rate and respiration returned to reassuring levels. The case seems to us to be an instance of the manner in which postoperative crisis can be considered a typical "circular" imbalance in which pathogenic factors themselves support and increase one another: so that interruption

of any one of them can be enough to allow the organic balance to become reestablished of itself. In our case, both thyroidectomy and hypoxia due to respiratory obstruction can be considered interrupting features of the syndrome.

CASE 4.—A man aged 38 had had, for about three years, a typical primary thyrotoxic syndrome: marked anxiety, exophthalmus, tachycardia, a high basal metabolic rate (plus 50 per cent), slight occasional fever and loss of weight. The symptoms were worsening more and more (pulse rate 150, basal metabolic rate plus 90-100%, fever) notwithstanding prolonged medical treatment at home, so that surgical intervention was mandatory. The usual preparatory neuroplegia was maintained for several days prior to the date fixed for the operation, but results were again very poor; the symptoms became still worse, so that controlled hypothermia was decided upon and applied preoperatively. Neuroplegia was therefore maintained by the usual technic except for the addition of high doses of short-acting barbiturates and curare (see diagram). In other words, body cooling was obtained and made tolerable by a condition of light surgical anesthesia and curarization, as our experience in Case 3 suggested that strong resistance to the usual neuroplegia alone was to be expected, on account of the high metabolic rate associated with the disease.

The use of heavy doses of muscle relaxants during the induction of hypothermia seems to have been justified, particularly by its suitability to the control of shivering and its well-known ganglioplegic effects.

Accordingly, one of us (Uleri) had employed curarization alone for the control of hyperthermia after operations on the brain. The role of muscle relaxants, therefore, in overcoming the critical phase of a strong reaction

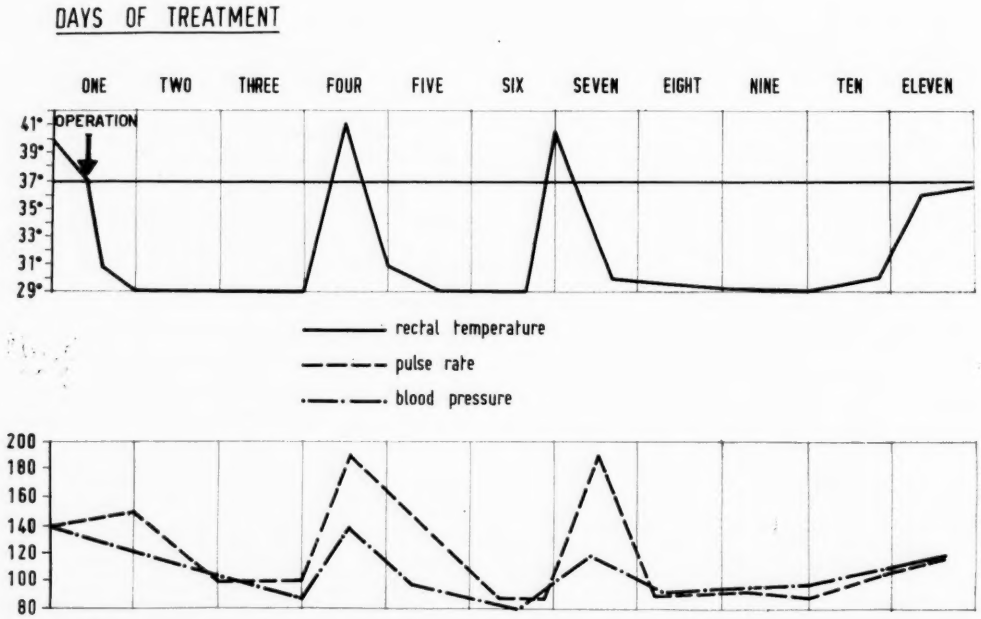


Fig. 2.—P. P., aged 34. Primary toxicosis, treated by thyroidectomy. Preoperative and postoperative general hypothermia was present. General hypothermia induced and maintained under anesthesia and vegetative neuroplegia. Thyroidectomy performed two hours after induction of hypothermia, as soon as rectal temperature had reached 37 C. On fourth and sixth days of treatment, respectively, attempt was made to suspend treatment, which had to be resumed after onset of threatening signs of toxicosis. Mean daily doses of drugs were as follows: for induction of cooling (first, fourth, and sixth days), Pentothal 1.5-3 Gm.; Flaxedil, 120 mg., lytic cocktail 1,500 ml.; Hydergine, 0.6 mg.; for maintenance of hypothermia, Pentothal, 1 Gm., or Viadril, 2 Gm.; lytic cocktail, 500 ml., and Hydergine, 0.6 mg.

to thermal aggression, which is correlated with the particular endocrine balance of hyperthyroidism, is obvious.

Curarization demands close watching for the possible need of controlling respiration. It must be borne in mind, however, that the high cellular potassium content associated with peripheral neuroplegia (Huguenard), makes it necessary to increase the usual requirement of muscle relaxants in order to obtain effective mioplegia.

The mean level of rectal temperature maintained during the treatment was 29 to 30 C. Cooling was induced more easily, in this case: once the lower level had been reached (within about five hours) it was possible to maintain it for six to eight hours, without having to continue either pharmacologic neuroplegia nor the use of icebags, on account of a "thermal" effect of neuro-endocrine blocking. One must, therefore, keep in mind that, at levels of body temperature as low as those reached in this case, normal body secretions decrease sharply, in accordance with the general lowering of the biologic rate, which accounts for a minor inconvenience encountered with this patient: reduction of the secretion of tears and absence of winking, maintained for several days, allowed the corneas to dry dangerously. A close watch, therefore, must be kept throughout prolonged treatment, lest ulceration of the cornea ultimately result. It was also observed that the patient did not require to be shaved throughout ten days of treatment: the growth of the beard and moustache was interrupted during hypothermia.

Under treatment the toxic symptoms subsided, tissue oxygenation improved, and the cardiac rate settled at a good level, as did the respiratory rate, the basal metabolic rate and the blood pressure. The output of urine was always satisfactory. The patient was fed parenterally. Thyroidectomy was easily performed as soon as the rectal temperature had become stabliized at 37 to 36.5 C, with no need of further anesthetic procedures. Tracheotomy was performed as soon as thyroidectomy had been completed; by reducing the dead space and allowing easy suction of bronchial secretions, tracheotomy has proved to be a useful complement of therapy.

In this case we realized that endocrine imbalance was unusually severe and prolonged; in fact, on the fourth and the sixth days of treatment an attempt was made to abandon hypothermia, but treatment had soon to be resumed because of immediate worsening of the symptoms (hyperthermia, severe peripheral cyanosis, electrocardiographic signs of anoxia of the heart muscle). Treatment could be definitively stopped only on the tenth day, after which the return to normal temperature was no longer associated with the onset of toxic symptoms. Recovery was uneventful thereafter. The patient was discharged on the twenty-first day after the operation.

GENERAL COMMENT

It has therefore been confirmed, on clinical grounds, that controlled hypothermia as here defined, i.e. body cooling associated with a heavy neuro-endocrinoplegic treatment, has proved a useful procedure in the management of surgical thyrotoxicosis. Comparison of the cases and results suggests that the milder conditions may be dealt with by prolonged preoperative, intra-operative and postoperative neuroplegia alone, which follows, after all, a long-established scheme of general sedation. In cases of more severe involvement, in which thyrotoxicosis is so predominant a feature of the disease that it alone requires surgical intervention, an extremely dangerous postoperative "vegetative storm" is to be expected, in which both nonspecific post-aggressive stress and specific posthyroidectomy imbalance are recognizable.

Particularly, a comparison between Case 3 and Case 4 of our series demonstrates the following points:

1. Unusually strong resistance to body cooling must be expected in such cases; therefore, in order to obtain an effective and easy lowering of temperature, one must be prepared to make use of heavy neuroplegia during the induction of hypothermia, or even of a true potential general anesthesia including the use of short-acting barbiturates and curare, should circumstances demand it.

2. On the other hand, the optimum standard level and duration of hypother-

mia cannot be established on theoretical grounds. Since the treatment is to be regarded as symptomatic, its methods and technics must be defined, case by case, according to the behavior of the main symptoms under treatment, including the body temperature itself. Because of the known drawbacks of the artificial lowering of body temperatures, treatment further after tissue oxygenation, respiration, circulation, psychic behavior and basal metabolism have returned to less threatening levels. For this reason, if an artificially maintained temperature of 36 to 37 C proves suitable in any particular case, much lower levels may be necessary to control more severe symptoms in another.

3. Since respiratory obstruction can be regarded as a factor of postoperative imbalance, tracheotomy should be routinely performed in all cases of surgical toxic goiter, when the preoperative course suggests that a thyrotoxic crisis may be expected.

SUMMARY

Controlled hypothermia, on theoretical grounds as well as on the basis of clinical experience, has proved effective in the management of thyrotoxicosis: (1) by blocking several neuro-endocrine links that support the syndrome; (2) particularly by interrupting the thyroid phases of the syndrome (this has particular importance) and (3) by insuring symptomatic control of hyperthermia and thus affording a means of metabolic and functional relief to the whole organism. On these grounds, the second case here described with full details seems to demonstrate especially well that hypothermia may be a positively life-saving device if it is carried out with suitable adaptation of technic to the individual case, even when employed, if necessary, up to unusual levels and duration.

ZUSAMMENFASSUNG

Behandlung mit kontrollierter Untertemperatur hat sich sowohl in der Theorie als auch auf Grund klinischer Erfahrung als wirksam bei Thyreotoxikose erwiesen. Die Hypothermie wirkt:

1. durch Blockierung verschiedener neurologisch-endokriner Bindeglieder, die das Syndrom unterhalten;

2. durch teilweise Unterbrechung der Schilddrüsenphasen des Syndroms und

3. durch die Möglichkeit, mit Hilfe symptomatischer Kontrollierung von Übertemperatur den gesamten Organismus stoffwechselmässig und funktionell zu schonen.

Aus diesen Gründen scheint der zweite hier mit allen Einzelheiten beschriebene Fall zu zeigen, dass die Anwendung der Untertemperatur sich tatsächlich als lebensrettend erweisen kann, vorausgesetzt dass die Technik des Verfahrens dem individuellen Falle angepasst wird, selbst wenn das bedeutet, dass ungewöhnliche Grade und ungewöhnliche Dauer der Hypothermie notwendig sind.

RIASSUNTO

L'ipotermia controllata si è dimostrata molto utile nel trattamento della tireotossicosi, sia sul piano teorico che sulla base della esperienza clinica:

1) attraverso il blocco di diverse articolazioni neuro-endocrine che sostengono la sindrome; 2) mediante la interruzione della fase tiroidea della sindrome; 3) assicurando il controllo della ipertermia e fornendo i mezzi del risparmio metabolico e funzionale all'organismo.

Su questi principi, il secondo caso presentato dimostra che la ipotermia può salvare la vita, ammesso che essa venga condotta nella maniera più corretta e spinta, se necessario, fino agli estremi gradi di durata e livello.

RÉSUMÉ

Théoriquement comme expérimentalement l'hypothermie contrôlée s'est révélée efficace dans le traitement des thyréotoxicoses:

1. par le blocage de plusieurs connections neuro-endocriniennes; 2. par l'interruption des phases thyroidiennes du syndrome; 3. par le contrôle symptomatique de l'hyperthermie, assurant ainsi un moyen d'économie métabolique et fonctionnelle de tout l'organisme. Sur ces données le second cas ici décrit de façon détaillée semble démontrer que l'hypothermie peut être réellement salvatrice à condition d'être conduite selon une technique judicieuse adaptée aux cas individuels, même lorsqu'elle est appliquée en cas de nécessité à des niveaux et pour une durée inaccoutumés.

SUMARIO

Baseado na experiência clínica e em fundamentos teóricos, provou ser eficiente no tratamento da tirotoxicose:

1. bloqueando as numerosas ligações neuro-endócrinas que suportam o sindrome; (2) particularmente por interromper as fases da tireóide no sindrome; (3) por assegurar controle sintomático da hipertermia e prover uma economia metabólica e funcional de todo o organismo.

Nestas bases, o segundo caso aqui descrito com bastante detalhes parece demonstrar que a hipotermia é eficiente em salvar a vida do paciente, sempre que seja aplicada com tecnica adequada e aplicada de acôrdo com os casos individuais. Afirma ainda que isto se extende, mesmo aos casos nos quais são usados níveis e durações incomuns.

RESUMEN

La hipotermia controlada, de acuerdo con sus fundamentos teóricos y con la experiencia clínica, se ha mostrado como efectiva en el tratamiento de la tirotoxicosis: (1) bloqueando ciertos eslabones neuroendocrinos sobre los que se asienta el síndrome (2) interrumpiendo las fases tiroideas del síndrome; (3) asegurando el control sintomático de la hipertermia y proporcionando así un medio para reducir el gastro funcional y metabólico del organismo.

Sobre estas bases, especialmente en el segundo caso descrito en este trabajo, parece demonstrarse que la hipotermia puede resultar verdaderamente salvadora de vidas con tal que se lleve a cabo técnicamente bien ajustada a cada caso particular, y hasta puede ser empleada, si es necesario, a niveles de duración fuera de lo normal.

REFERENCES

1. Bobbio, A.; Goffrini, P., and Bezzi, E.: L'hibernation artificielle selon la méthode de Laborit, Presse Méd. **60**:1708, 1952. Goffrini, P., and Bezzi, E.: L'ipotermia generale controllata in chirurgia. Pisa: Omnia Medica, 1954.

2. Goffrini, P., Scorta, A.: Valutazione della funzionalità tiroidea mediante la captazione del radio-iodio nel blocco farmacologico del sistema nervoso vegetativo e nell'ibernazione artificiale, Minerva med. **44**:347, 1953.

3. Bezzi, E.: La crisi tireotossica post-operatoria. Le basi fisiopatologiche del suo tratamento con l'ipotermia generale, Minerva med. **47**:386, 1956. Goffrini P., and Bezzi, E.: Le traitement des thyréotoxicoses chirurgicales par neuroplégie végétative et hypothermie générale (hibernation artificielle), Anesth. & Analg. **13**:451, 1956.

4. Uleri, G.: L'ipotermia protratta nel trattamento della tireotossicosi grave e ribelle, Ateneo Parmense **30**, Suppl. 4, 1959.

Trendelenburg's Operation for Pulmonary Embolism with Modified Technic

Report of a Case of Successful Intervention

J. WIEBERDINK, M.D., F.I.C.S.*

AMSTERDAM, THE NETHERLANDS

THE following case of potentially fatal pulmonary embolism, successfully treated by a modified Trendelenburg operation, illustrates the possible benefits of a procedure:

REPORT OF CASE

On March 27, 1958, a 73-year-old man was admitted to my department with a right-sided, irreducible femoral hernia and homolateral spermatocele. On April 13, after medical treatment of mild hypertension (220 mm. of mercury systolic and 100 mm. diastolic), resection of the hernial sac and spermatocele was performed. The abdominal wall was repaired according to the Lotheisen-Bassini-Hackenbruch method. The postoperative course was uneventful until April 21; particularly there were no signs of thrombosis. Then, with the patient already ambulant, signs of pulmonary embolism suddenly developed: pain in the thorax, with respiratory impediment, collapse, dyspnea and cyanosis. The patient recovered in about one minute, after which his condition did not seem alarming. He was treated with rest, oxygen, spasmolytic agents (procaine and papaverine administered intravenously) and an anticoagulant (heparin also given intravenously). For about one hour the general condition, pulse and blood pressure remained satisfactory. As a safety measure, however, the surgical, anesthetic and medical staff were warned, and the operating theater was prepared for an emergency. One hour later the condition of the patient again deteriorated rapidly, probably owing to renewal of the embolism. The blood pressure could no longer be measured. There was loss of consciousness, with dyspnea and cyanosis. Pulmonary embolectomy was considered imperative. The patient arrived in the operating room deeply comatose, cyanotic and pulseless. Protamine sulfate was administered intravenously and thoracotomy commenced while intubation was performed. The points of insertions of the second and third ribs at the sternum were severed and the pericardium reached through the anterior part of the left second intercostal space. No attempt was made to keep the left pleura intact. The pericardium, tightened over the dilated heart, was opened over the stem of the pulmonary artery. No steps were taken to encircle the aorta and the pulmonary artery. Immediately a stab wound, about ½ inch (1.2 cm.) in length, was made

*Acting head of the Surgical University Department, Wilhelmina Gasthuis, Amsterdam (Head Prof. Dr. I. Boerema).

Submitted for publication Sept. 10, 1958.

A case of successful pulmonary embolectomy (Trendelenburg's operation) is reported. The author comments briefly on the justification of this procedure, its indications and its technical aspects. Paradoxic embolism as a possible complication of pulmonary embolism is mentioned, and new trends in pulmonary embolectomy are discussed.

in the pulmonary artery, through which a curved forceps was introduced. The loss of blood was controlled, as far as possible, by the surgeon's left index finger placed on the incision. Large clots were removed from the bifurcation and from the main branches of the pulmonary artery. The anesthetist immediately reported restoration of the circulation. A blood transfusion was given and anesthesia commenced. In the meantime the pulmonary artery was closed by lateral clamping and sutured with atraumatic interrupted mattress and continuous silk sutures. The action of the heart required support for several minutes by means of massage and intracardial administration of epinephrine. Careful hemostasis was secured. The pericardium and thorax were closed and a drain left behind in the left pleural space. Immediately after the operation, achromycin was given, and nine hours later, anticoagulants. Consciousness returned shortly after the operation, with complete amnesia retrograde to the first manifestation of the pulmonary embolus. Severe complications had to be overcome: cardiac irregularities, hypotension, intestinal paralysis, uremia, pneumonia, staphylococcic enteritis, decubitus and psychic disturbances. On May 3 the patient could be mobilized, and on May 14 he was discharged from the hospital. Two months after the embolectomy his condition was satisfactory. The hernial repair was intact. Figure 1 shows the patient and Figure 2, the emboli removed.

I consider it justifiable to consider this patient saved by Trendelenburg's operation. Earlier successes of this operation have been reported by Kirschner (Königsberg, 1924; 1 case), A. W. Meyer (Charlottenburg, 4 cases), Crafoord (Stockholm, 3 cases), Nystrom (Uppsala, 2 cases), Valdoni (Rome, 1 case), Lewis (London, 1 case), Lehner (Lucerne, 1 case), and Marion (Lyon, 2 cases, which might, however, be classified differently—see further on). Provided that this list from the literature is complete, 14 or 16 patients (Marion's included) have been saved by Trendelenburg's operation in the period between its conception and today. During the same period hundreds of thousands of patients, at a rough estimate, must have died. In the Netherlands, for instance, with 11 million inhabitants, about 600 deaths from pulmonary embolism are recorded every year. Pulmonary embolism is an important cause of postoperative death, in spite of modern treatment. In my department, where 14,717 operations were performed during the past twelve years, 68 patients (0.46 per cent) died of postoperative pulmonary embolism. The introduction of anticoagulants has not influenced this figure significantly. From these facts it is clear that Trendelenburg's operation has saved the lives of a mere fraction of the patients for whom it was destined. Some aspects of this treatment, however, deserve further attention. For a general survey the reader is referred to the literature.

Justification of Pulmonary Embolectomy.—Many a careful surgeon is reluctant to accept the indications for Trendelenburg's operation. He realizes that he will frequently be working under unfavorable conditions, doomed almost to add failure to the already dramatic disaster of massive pulmonary embolism. Besides conservative treatment of pulmonary embolism sometimes results in unexpected success; in these cases operation might have been harmful. In addition, he has to consider the possibility of a mistaken diagnosis. In my opinion, however, the mortality rate associated with pulmonary embolism not treated by operation calls for persistance, in order to profit to the utmost from this surgical treatment, which in principle is logical and simple. Neither can the surgical technic be considered difficult in current cardiovascular surgery. Emphasis must be laid on the organization of the department. Appropriate instruction can make both the surgical and the nursing staff conscious of possibilities hitherto considered unacceptable. Still, the dangers of haste and the risk of the operation have to be accepted; therefore, I immediately exclude as candidates for the Trendelen-

burg operation patients with a doubtful diagnosis, as well as patients in whose cases even a successful embolectomy cannot render the prognosis favorable; for instance, those with incurable malignant disease. Thus I agree with others (Giertz and Crafoord, and Redon, for instance) that an active but careful policy may offer a few patients the benefits of Trendelenburg's operation without adding to the mortality rate. In my opinion, progress must be sought along these lines.

The Moment of Decision. — Trendelenburg based his operation on the observation that in about half the cases of fatal pulmonary embolism fifteen minutes or more elapse between the first sign and death. This has been confirmed by most authors and is in accordance with my experience: of 47 of my patients, 26 lived for this period of time. Theoretically they may be classified as candidates for embolectomy. As many of this group survive considerably longer than a quarter of an hour, there has been much controversy as to when immediate operation is indicated. As there are no infallible signs to indicate the correct moment of operation, vague formulations are inevitable (Leriche). Early in this century "when the patient begins to die" was considered the justified moment for surgical attack. Like others, I accepted this indication at first. I soon learned, however, that it is of little use to operate on a dying patient and that the development of surgery today allows an earlier decision. I therefore substituted "when it becomes clear that no other treatment can save the patient," as the time for surgical intervention. This immediately brought the possibility of cure within reach. Of 4 patients operated on since then, 2 have survived the operation. One has already been described; the other will be mentioned under "paradoxic embolism." Of course, surgical treatment must never be a reason for delay or for omitting medical measures (vasodilator drugs, oxygen, etc.). Anticoagulants may even be given, as open heart operations have created the possibility of neutralization with protamine sulfate.

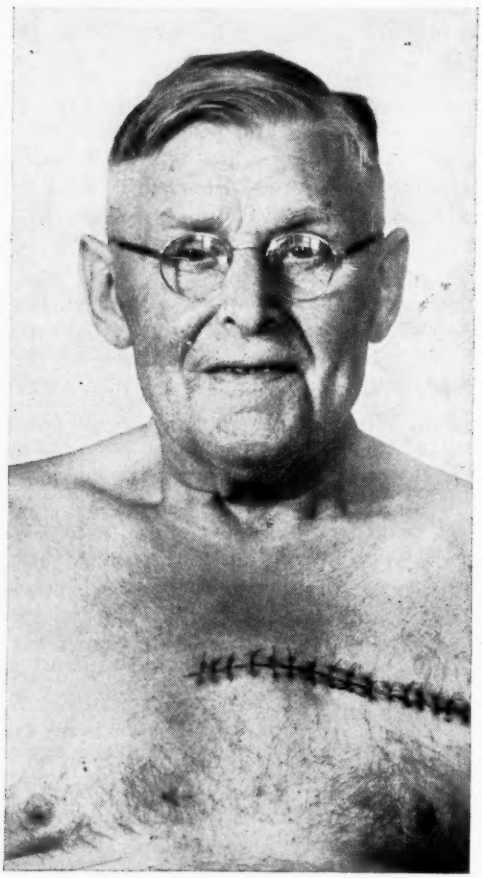


Fig. 1.—Patient whose case is here reported, four weeks after Trendelenburg operation.

Surgical Technic.—Nowadays, Trendelenburg's operation is not technically difficult; it holds no unsurmountable problems for senior surgical residents with cardiovascular experience. It is beyond the scope of this article to justify this statement. A few words, however, must be dedicated to the technic of handling the pulmonary artery. Trendelenburg has stressed

Fig. 2.—Operative specimen in same case.

the importance of encircling the vessel in order to pull it within easy reach, so as to close it at its base during the arteriotomy. He developed a special probe for carrying out the maneuver as quickly as possible. He advocated the encircling of both the aorta and the pulmonary artery. This view has subsequently been supported by all authors on the subject. Some confusion has arisen through a publication by A. W. Meyer, who held the same opinion as Trendelenburg but who, in accompanying illustrations, gave the impression that only the pulmonary artery was encircled. These illustrations have been taken over by other authors, even to illustrate handbooks of surgical technic. This may lead unsuspecting surgeons to attempt separation of the pulmonary artery from the aorta, which is time consuming and also dangerous. I have diverged from the more or less generally accepted technic by abandoning the encircling completely. I prefer to have the pulmonary artery untouched before it is incised in order to prevent all possibility of shifting the embolus to the periphery. Constriction of the pulmonary artery at

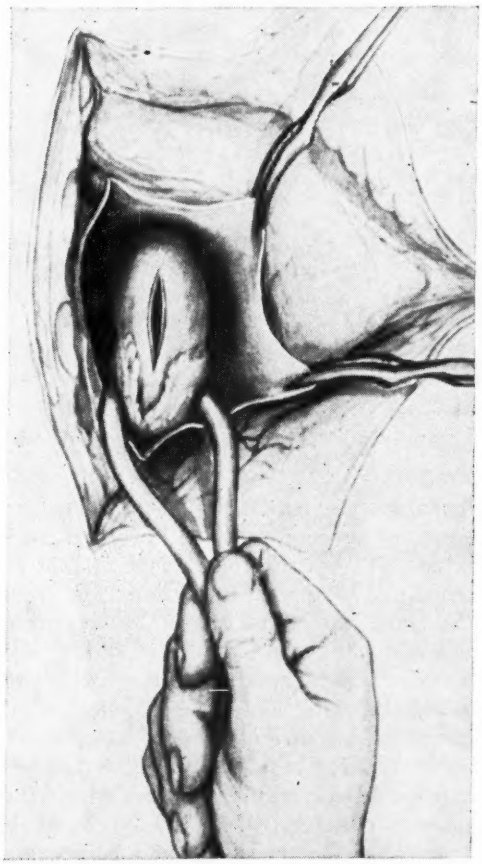


Fig. 3.—Illustration from A. W. Meyer's article (Surg. Gynec. & Obst. 50:893, 1930). This drawing, which has been reproduced in several textbooks of surgery, suggests that the pulmonary artery only is encircled. Encircling of this vessel and aorta, however, is an essential part of Trendelenburg's technic and of Meyer's modification as well. Misleading character of illustration is probably due to the fact that collapsed aorta is hidden behind distended pulmonary artery.

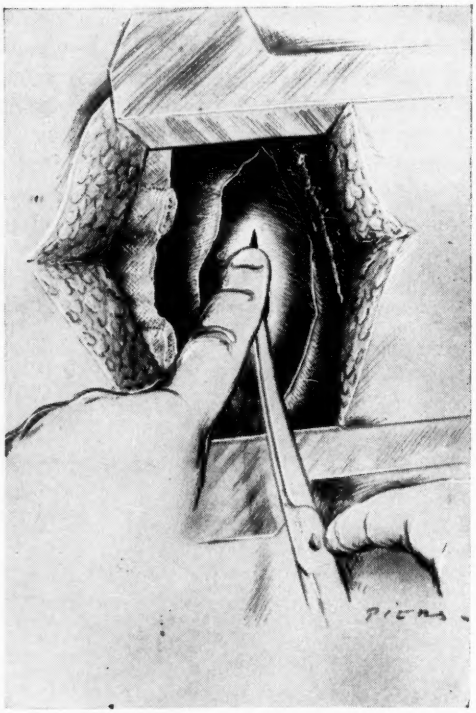


Fig. 4.—Author's technic for removal of pulmonary embolus.

its base to prevent loss of blood is no longer essential, as compensation by transfusion is possible. On the contrary, a stream of blood may be useful to rinse emboli from the right side of the heart and to relieve the distended right ventricle. While the surgeon's right hand holds the forceps to grasp the clots, loss of blood may be reduced by pressure of the left index finger on the incision (Fig. 4). When the obstruction has been removed, pressure within the pulmonary artery is restored to such levels that tangential clamping and suture are possible without constriction at the base. Objections to encircling the arteries are the risk of traumatic lesions (reported in literature) and the necessary loss of time. Finally, constriction of the pulmonary artery may add to the risk of paradoxical embolism (see next paragraph).

Paradoxical Embolism.—I have already mentioned the fact that early operation immediately brought hope of cure. One patient, a 53-year-old man, underwent pulmonary embolectomy eight days after gastric resection. A large embolus was removed, after which the patient regained consciousness and showed other signs of restored circulation. During the operation, however, the electrocardiogram suddenly showed symptoms of myocardial infarction, and on awakening symptoms of cerebral embolism became evident. The patient died one and one-half days after the embolectomy. At autopsy a patent foramen ovale was observed, and death was attributed to paradoxic embolism into the coronary and cerebral circulation. In my opinion unexpectedly fatal complication should not be considered merely bad luck, because approximately one-fourth of all adults show probe patency of the foramen ovale (see Kaufmann, Schwalbe, Taussig), which may result in a right-to-left shunt by the increased pressure in the right side of the heart and a fall of pressure in the left side after embolic obstruction of the pulmonary artery. Emboli may pass into the systemic circulation or, as Elliott and Beamish have recorded, be caught in the foramen ovale. Either condition may be fatal and must be considered a possible complication of pulmonary embolism in patients with a communication between the two sides of the heart, roughly speaking 1 patient in 4. This conception is substantiated by the fact that Crafoord also lost a patient after Trendelenburg's operation; the conditions, verified by autopsy, were similar.

New Trends in Pulmonary Embolectomy.—History has hallmarked Trendelenburg's operation as an *ultimum refugium.* It is questionable whether this conception still holds true. In principle, embolism can be treated by conservative means or by removal of the clot. Arteriotomy, even of

the pulmonary artery, can no longer in itself be considered a very dangerous procedure. This might justify extension of indications for pulmonary embolectomy at the expense of conservative treatment. Marion advocates surgical treatment also for those forms of pulmonary embolism which cause gradual death. He advises a retrograde route, through the left pulmonary artery. Certainly this means an important extension of the indication, as it is doubtful whether those conditions are definitely fatal if no operation is performed. The present status of cardiovascular diagnosis and surgery justifies, in my opinion, careful exploration in this field. If this is true, Trendelenburg's operation must be classified as only one of the available pulmonary embolectomies, although the oldest and greatest of them. It seems possible that the latter development may give fresh stimulus to Trendelenburg's famous conception.

Addenda: 1. After completing this article I noted the published report of the first successful Trendelenburg operation by Steenburg and his collaborators in the United States (Boston). The case reported may be interpreted as a confirmation of my view that paradoxical embolism is a real danger to these patients. (See Steenburg, R. W.; Warren, R.; Wilson, R. E., and Rudolf, L. E.: A New Look at Pulmonary Embolectomy, Surg., Gynec., & Obst. **107**:214, 1958.)

2. After this article had been accepted for publication, another successful Trendelenburg operation was performed, this time by Prof. Boerema. The patient, a 39-year-old man, underwent resection of the apical segment of the right lower lobe for bronchiectasis. The postoperative course was uneventful until the ninth day (Sept. 27, 1958), when the patient suddenly showed typical signs of serious pulmonary embolism. He was treated with spasmolytic agents and oxygen. He showed temporary improvement. After about half an hour, however, his condition deteriorated again, and embolectomy was considered imperative. The author's technic was followed. An embolus 28 cm. long was removed from the left pulmonary artery. No clots were observed on the right side. After embolectomy the patient recovered satisfactorily. In spite of the administration of anticoagulants, he showed signs of thrombosis in the left leg two days later. Four weeks afterward he was discharged from the hospital in good condition.

ZUSAMMENFASSUNG

Es wird über einen Fall von erfolgreicher chirurgischer Entfernung eines Lungenembolus (Trendelenburgsche Operation) berichtet. Der Verfasser geht kurz auf die Rechtfertigung, die Indikation und die Technik dieses Eingriffs ein. Er erwähnt die Möglichkeit einer paradoxen Embolie als Komplikation einer Lungenembolie. Neue Richtungen in der Ausführung der Resektion eines Lungenembolus werden erörtert.

RÉSUMÉ

Un cas d'embolectomie pulmonaire opéré avec succès (opération de Trendelenburg) est rapporté. L'auteur discute brièvement la justification de cette intervention, son indication et sa technique. La possibilité d'une embolie paradoxale comme complication d'une embolie pulmonaire, est mentionnée. Les nouvelles tendances relatives à l'embolectomie pulmonaire sont discutées.

RESUMEN

Se da cunta de un caso operado on éxito de embolectomía pulmonar (operación de Trendelenburg). El autor comenta brevemente la justificación, la indicación y la técnica de la operación. Menciona también la posibilidad de embolismo paradójico en la embolia pulmonar. Se discuten nuevas ideas en el embolismo pulmonar.

SUMARIO

Comunicca um caso bem sucedido de embolectomia pulmonar (op. de Trendelenburg). Comenta brevemente as indicações e a tecnica e diz da possibilidade de embolia paradoxal como complicação da embolia pulmonar. Discute novas taticas da embolectomia pulmonar.

BIBLIOGRAPHY

Bénichoux, R.: J. Int. Chir. **11**:464, 1951.
Crafoord, C.: Acta Chir. Scand. **64**:172, 1928.
Crafoord, C., and Bénichoux, R.: Rev. méd. Nancy **77**:523, 1952.
Eichelter, G.: Chirurg. **4**:209, 1932.
Elliott, C. B., and Beamish, R. E.: Circulation **8**:394, 1953.
Giertz, K. H., and Crafoord, C.: Acta Chir. Scand. **64**:121, 1928.
Griswold, R. A.: Ann. Surg. **98**:33, 1933.
Irwitt, E. S.; Schein, C. J.; Rifkin, H., and Lebendiger, A.: Ann. Surg. **147**:157, 1958.
Kaufmann, E.: Lehrbuch Spez. Path. Anat. I, Berlin, 1955.
Key, E.: Acta Chir. Scand. **54**:339, 1922.
Kirschner, M.: Arch. klin. Chir. **133**:312, 1924.
Lehner, A.: Schweiz, med. Wschr. **77**:127, 1947.
Leriche, R.: Lyon Chir. **41**:257, 1946.
Lewis, I.: Lancet **236**:1037, 1939.
Marion, P.: Mém. de l'Acad. Chir. **79**:239, 1953.
Marion, P., and Estanove, S.: Sem. Hôp. Paris **32**:1888-1891, 1956.
Meyer, A. W.: Deutsch. Zschr. Chir. **205**:1, 1927; Med. Klinik **24**:1436, 1928; Deutsch. Ztschr. f. Chir. **211**:352, 1928; Surg., Gynec. & Obst. **50**:891, 1930; Deutsch. Ztschr. f. Chir. **231**:586, 1931.
Meyer, W.: Ann. Surg. **58**:188, 1913.
Nyström, G.: Acta Chir. Scand. **64**:110, 1928; Ann. Surg. **92**:498, 1930.
Redon, H.: J. Chir. **62**:267, 1946.
Santy, P.; Guillemin, G., and Marion, P.: Lyon Chir. **47**:850, 1952.
Schmidt, W. J. H.: Thesis, Amsterdam, 1953.
Schornagel, H. E.: Nederl. Tijdschr. Geneesk. **91**:3347, 1947.
Schambaugh, P.: Ann. Surg. **104**:823, 1936.
Schwalbe, E.: Die Morphologie der Missbildungen des Menschen und der Tiere, Jena, 1910.
Taussig, H.: Congenital Malformations of the Heart. New York, 1948.
Trendelenburg, F.: Arch. klin. Chir. **86**:686, 1908.
Valdoni, P.: Policlinico **43**:1143, 1936.
Westerborn, A.: Ann. Surg. **93**:816, 1931.
Wright, I. S., and Foley, W. T.: Am. J. Surg. **64**:440, 1955.
Wustmann, O., and Hallervorden, J:. Deutsch. Ztschr. f. Chir. **245**:472, 1935.

The man of action, the real adventurer, like Marco Polo, Casanova, or Pizarro, lacks an inner life. He lives extraversively, ever looking outward, and for him, words are merely tools and so are the ideas they contain. The intellectual lives an inner life, always looking inward, heedful of his ideas and emotions. The man of action does not exist for himself, and the hubbub of the outer world to which he is always tuned does not allow him to hear his inner voice. He is dominated by impulse, not by imagination, which he lacks completely. And imagination is the key to the vocation of the intellectual.

The physician's psychologic conflict is that medicine in all its fields, even in research, is eminently a profession of men of action. This is particularly true of the surgeon, that swordsman of medicine, who thinks with his fingertips and writes with his scalpel, who lives in a perpetual race against the clock, and on whose ability for quick decisions as he works the lives of his patients depend. Even the general practitioner is ever more the man of action as he tries to outrace disease or, at least, to keep up with the present swift pace of science.

—Marti-Ibañez

Sección en Español

¿Carcinoma "in Situ" del Cuello Uterino?

(Carcinoma "in Situ" of the Uterine Cervix?)

OSCAR BLANCHARD, M.D., F.I.C.S.

BUENOS AIRES, ARGENTINA

Carcinoma in situ *of the uterine cervix is discussed from the terminologic, diagnostic and therapeutic points of view. The author emphasizes the importance of the histologic picture in diagnosis and illustrates the point with representative photomicrographs. Treatment is selective, depending on the age and parity of the patient and the presence or absence of other lesions or disorders, such as ovarian tumors, chronic inflammation or abnormally prolonged menstruation.*

El llamado carcinoma "in situ" del cuello uterino es motivo de repetidas comunicaciones que en principio mantienen cierta continuidad pero son dispares en cuanto al alcance de su terapéutica y significación como fisonomía de esa entidad histopatológica, ya que clínicamente no es fácil su identificación.

Se acepta que una definición debe concretar la afirmación de identidad de sentido entre dos términos: el término que se define y el término definidor. El término que ha de ser definido representa un concepto que apunta a cierta clase de objeto singular, físico o ideal; la denominación "carcinoma in situ" sólo se justificaría por el uso frecuente que se ha hecho del mismo pues, desde ya nos apresuramos a establecer, como lo hiciera Hinselmann[1] que, no tiene mayor relación con el verdadero y formal sentido de la palabra carcinoma. El término definidor se compone primero de la designación de una clase más amplia (llamada género) que comprende la especie que ha de ser definida y segundo, del la enumeración de las diferencias o caracteres específicos que la distinguen entre los demás miembors. En relación a esto último han sido descriptos, repetidamente desde hace casi medio siglo[2] los elementos histológicos que debe reunir el epitelio cervical para ser considerado como patognomónico de la entidad que nos ocupa, a saber: *límites celulares imprecisos con ausencia de estatificación regular característica y desorden de la alineación de las células basales, núcleos irregulares, grandes o picnóticos hipercromáticos y finalmente mitosis atípicas.* Puede proliferar en forma de manchones sobre la superficie del ectocérvix, como hacia la profundidad aunque respetando siempre la integridad de la basal y aún penetrar en las glándulas endocervicales. En otras palabras esa estructura no difiere de un carcinoma verdadero pero adviértase que circunscripto al epitelio superficial y sin la evolución o propagación propia de aquél.

Está claro que existe en esa nosología una primera dificultad en cuanto a la con-

tradicción que significa clínica e histopatológicamente la palabra carcinoma con respecto al así llamado carcinoma "in situ" cervical. Y, es así que existen trabajos sobre el epígrafe donde se ha cometido hasta el error de considerarlos como tales aún en ausencia de las características definitorias de esta lesión. Tal sucede cotejando las microfotografías de publicaciones donde aparecen lesiones que en verdad no reunen los elementos histológicos antes señalados.[3]

En nuestro sentir se confunden lesiones que Sammartino—a quién agradecemos las microfotografías de este trabajo—de acuerdo con otros autores,[4] agrupa para mayor claridad en tres tipos que no sólo tienen distinta significación histológica sino también fundamental pronóstico diferente. En efecto preciso es distinguir: 1°) *los epitelios pavimentosos anómalos* (hiperqueratosis, paraqueratosis, epitelización de seudoerosión y ectropión, regeneración inflamatoria e hiperplasia basal) que en varios casos han sido clasificados como carcinomas "in situ" (Fig. 1). 2°) *los llamados epitelios pavimentosos inquietos o sospechosos* por R. Mayer (Fig. 2) pues no reunen la totalidad de los caracteres del grupo siguiente y solo algunas, como ser la hiperplasia avanzada de la basal, etc. 3°) *los epitelios pavimentosos atípicos* que son los únicos que corresponderían a los conocidos carcinomas "in situ," es decir que prescindiríamos de la palabra carcinoma para solo designar el aspecto morfológico que hemos descripto de la lesión (Fig. 3). Puntualizamos también que al decir epitelio atípico se señala precisamente la similitud con la localización superficial de un carcinoma verdadero —designado por Hinselmann[1] matriz III B y C (Fig. 4)—diferenciándolo por otra parte, netamente, de los otros dos grupos.

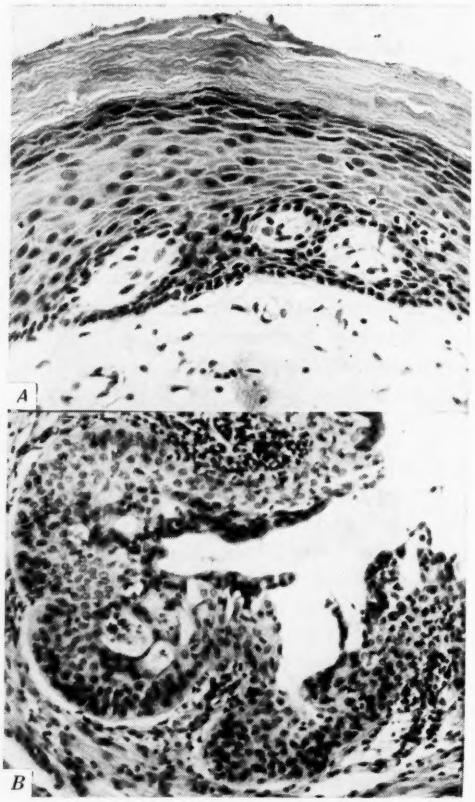


Fig. 1.—*A*, epitelio anómalo con intensa hiperqueratosis (× 300). *B*, epitelio anómalo. Campo de pseudoerosión en el 2° grado de curación. Hay exudados neutrófilos y mezcla de epitelio cilíndrico y pavimentoso (× 200).

En cuanto a la *evolución* de los epitelios atípicos sabemos por la bibliografía que pueden permanecer en estado estacionario por un tiempo variable (Galvin y col.[5]) y luego evolucionar o no hacia un carcinoma invasor. Esto tampoco significa que todo carcinoma se haya iniciado precisamente en este estadio superficial o atípico del epitelio cervical; los casos de reversibilidad hacia la curación espontánea se tratarían en su mayor parte de epitelios que hemos descripto o agrupado como pavimentosos "anómalos." Un aspecto interesante que señaláramos también en un trabajo anterior[6] es la evolución de dos pacientes con diagnóstico histológico de cervicitis crónica las cuales en el lapso de 6

meses y de dos años después respectivamente se comprueba una matriz III de Hinselmann, vale decir un epitelio francamente atípico.

En definitiva el *diagnóstico* del epitelio atípico—dado en llamar carcinoma "in situ"—es exclusivamente histológico vale decir que clínicamente no existen elementos que puedan reconocerlo. De ahí la importancia fundamental que tiene la experiencia del patólogo quién en alguna oportunidad deberá aconsejar la conducta a seguir, según la extensión de las estructuras halladas e incluso llegar a la repetición de las biopsias. Además *es posible su pesquisa mediante el auxilio de la colpocitología y la colposcopía.*[7] Esto último permite sin duda una mejor orientación para obtener la biopsia según lo comprobáramos en nuestra práctica hospitalaria y privada.[6] En efecto entre los años 1950-1955 en el Servicio de Ginecología del Hospital "Juan A. Fernandez" (Buenos Aires-Argentina) se observaron 150 carcinomas cervicales y 4 carcinomas "in situ" o mejor dicho indubitables epitelios atípicos, merced al empleo sistemático de la colpocitología y especialmente de la colposcopía que permite una orientación exacta de la toma biópsica. Para las localizaciones endocervicales tiene ventajas la colpocitología (Palmer[8]).

En cuanto al medio a seguir para el *tratamiento* de estos epitelios la mayoría de los autores están de acuerdo en una conducta quirúrgica[1]—permite su estudio posterior—empero en sus fines o alcances son variados o adecuados a las circunstancias de cada caso in particular. En cambio—diremos al pasar—en un carcinoma invasor el fin del tratamiento es siempre único, es decir conseguir la extirpación amplia del mismo y sólo varían los medios para alcanzarlo (quirúrgicos, actínicos, etc.). Con esto queremos avalar, aún más, que para designar estas lesiones atípicas del epitelio es impropio la denominación "carcinoma in situ," pues no tiene ni la significación histológica ni el poder de invasión del carcinoma verdadero.

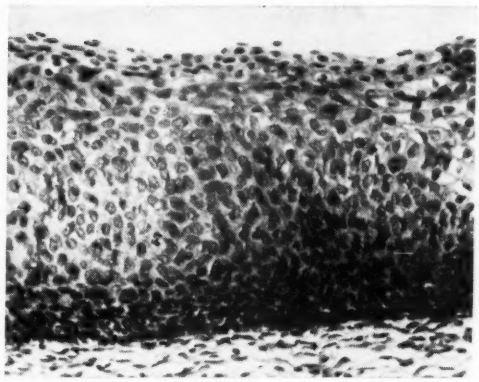


Fig. 2.—Epitelio sospechoso e inquieto. Hiperplasia de la basal con indiferenciación en el cuerpo mucoso, sin embargo hay cierta tendencia de maduración y estratificación. Paramitosis (× 300).

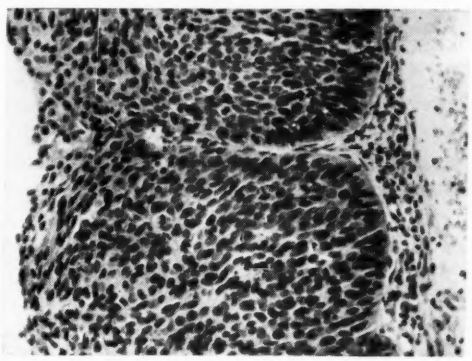


Fig. 3.—Epitelio atípico o matriz III. Sup. de Hinselmann (× 250).

Por nuestra parte[10] una vez establecido el diagnóstico correcto de la imágen histológica, *que no debe ser precipitado para evitar confundirlo con los epitelios anómalos o inquietos*—según se estableciera antes—el tratamiento de la paciente portadora de lesiones cervicales atípicas como las descriptas se considera en relación a los siguientes elementos: 1º) edad de la paciente; 2º) paridad y deseo por parte de la misma de tener descendencia y 3º) conco-

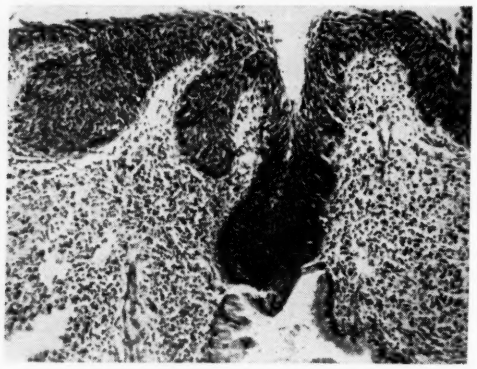


Fig. 4.—Epitelio atípico que reproduce el cuadro de una matriz III "b y c" de Hinselmann (× 140).

mitancia de un embarazo o presunción de otras lesiones (miomas, blastomas del ovario, inflamaciones crónicas más o menos extensas).

Así una conducta *espectante* claro es que será excepcional pero solo permitida entre aquellas mujeres de 30 años de edad, nulíparas y durante un embarazo, a condición de continuar una observación periódica por lo menos cada seis meses. La *conización y la amputación cervical* se encuentra indicada—excepto repetimos durante la evolución de una gravidez—con algunas reservas entre este grupo de enfermas como en otras y sólo para concretar un estudio más prolijo de los tejidos por si hubiere un verdadero carcinoma infiltrativo que oblique a reintervenir para una exéresis más radical (Palmer[3b], Wespi[7d]); Palmer[3a] hizo la comprobación de un carcinoma intracervical, junto a un epitelio atípico ectocervical.

La *histerectomía total simple* es la terapéutica más preconizada para estas lesiones conservando los ovarios para no producir fenómenos de castración[11], pero que se asociará a una salpingooforectomía bilateral según la edad u otras lesiones útero anexiales de la paciente. Por último *la colpoanexohisterectomía total ampliada a lo Wertheim* entendemos que puede tener una indicación formal y lógica si conceptuamos que esta técnica no ha logrado erradicar definitivamente al carcinoma cervical en el estadio I de su evolución o dicho con otras palabras cuando todavía se encuentra circunscripto a los límites del cuello del útero[12]. Por tanto serían precisamente los epitelios atípicos, como que muchas veces son verdaderos estadios precursores e iniciales los que con este último procedimiento quirúrgico estarían a cubierto de recidivas y lograr el 100% de curaciones absolutas definitivas. En nuestra práctica estas dos últimas conductas son las que hemos utilizado: histerectomía total simple conservando anexos in un solo caso y en las restantes, histerectomías ampliadas.

En síntesis creemos que debe quedar perfectamente aclarado que el así llamado carcinoma "in situ" es solo diagnosticable histológicamente ante un verdadero epitelio atípico con un significado que no es el del verdadero carcinoma por lo que no puede merecer el nombre de tal; su evolución es variable entre una permanencia más o menos prolongada o su transformación hacia un carcinoma invasor y de ahí que el tratamiento debe estar fundamentalmente vinculado a la edad de la paciente, embarazo, paridad u otras lesiones asociadas y por supuesto *después de un concienzudo estudio de la lesión histológica hallada.* En pacientes jóvenes, nulíparas y que deseen tener hijos — repetimos — la terapéutica apropiada es la amputación cervical pero a condición de su estudio posterior, exhaustivo del mismo y vigilancia periódica. *Durante una gravidez conviene la expectación.* En mujeres próximas a su menopausia la histerectomía "total" simple puede ser suficiente o con la extirpación de los anexos si así lo requieren las circunstancias. Cuando la histología es categórica—atipías exageradas, proliferación indiferenciada, etc.—o existe la posibilidad de un micro carcinoma (no más de 2 mm de penetración) y el estado general de la

paciente lo permite, lo lógico e ideal es realizar la histerectomía ampliada según técnica de Wertheim que sin duda llegará a la erradicación de la enfermedad.

REFERENCIAS

1. Hinselmann, H.: La colposcopía. Wuppertal-Elberfeld: W. Girardet, 1954.
2. Rubin, I. C.: Ans. J. Obst. 62:668, 1910.
3. Mullen, S. A., and Foraker, A. G.: Obst. and Gynec. 3:274, 1954. Palmer, R.: Bull. Fed. Soc. Gynec. et d'Obst. 4:458, 1952; Comp. Rend. Soc. Franc. de Gynec. 2:140-146, 1953.
4. Sammartino, R.: Sinopsis, Obst. & Gynec. 2:481, 1955.
5. Galvin, G. A.; Jones, H. W., et Te Linde, R. W.: J.A.M.A. 149:744, 1952.
6. Blanchard, O., y Onorati, C. L.: Tessaro Ana, F.: Bol. Soc. Obst. y Gynec. Buenos Aires 32:93, 1953.
7. Binet, A.: Nancy Med. 81:6, 1956. Danon, I., et Salinger, S.: Jour. Suisse de Med. 17:442, 1950. Limburg, H.: Die Frühdiagnose des uterus carcinoms. Stuttgart: G. Thieme Verlag, 1952. Wespi, H.: Early Carcinoma of the Uterine Cervix. New York: Grune and Stratton, 1949.
8. Palmer, R., et De Brux, J.: Bol. Fed. Soc. Gynec. et d'Obst. 8:319, 1956.
9. Te Linde, R. W.: Progress in Gynecology. New York: Grune and Stratton, 1946, p. 349.
10. Blanchard, O.: Sinopsis, Obst. Gynec. 2:597, 1955.
11. Funck-Brentano, P.; Moricard, R.; Palmer, R., et De Brux, J.: Bull. Fed. Soc. Gynec. et d'Obst. 4:80, 1952.
12. Keller, R.: Bull. Fed. Soc. Gynec. et d'Obst. 4:456, 1952.

Certain antipathies appear to depend upon a peculiarity of the senses. The horror inspired by the odour of certain flowers may be referred to this cause. Amatus Lusitanus relates the case of a monk who fainted when he beheld a rose, and never quitted his cell when that flower was blooming. Scaliger mentions one of his relations who experienced a similar horror when seeing a lily. In these instances it is not the agreeableness or the offensive nature of the aroma that inspires the repugnance; and Montaigne remarked on this subject, that there were men who dreaded an apple more than a musket-ball. Zimmerman tells us of a lady who could not endure the feeling of silk and satin, and shuddered when touching the velvety skin of a peach. Boyle records the case of a man who felt a natural abhorrence to honey. Without his knowledge, some honey was introduced in a plaster applied to his foot, and the accidents that resulted compelled his attendants to withdraw it. A young man was known to faint whenever he heard the servant sweeping. Hippocrates mentions one Nicanor who swooned whenever he heard a flute: our Shakespeare has alluded to the effects of the bagpipe. Julia, daughter of Frederick, king of Naples, could not taste meat without serious accidents. Boyle fainted when he heard the splashing of water; Scaliger turned pale at the sight of water-cresses; Erasmus experienced febrile symptoms when smelling fish; the Duke d'Epernon swooned on beholding a leveret, although a hare did not produce the same effect. Tycho Brahe fainted at the sight of a fox, Henry the Third of France at that of a cat, and Marshal d'Albert at a pig. The horror that whole families entertain of cheese is generally known. Many individuals cannot digest, or even retain certain substances, such as rice, wine, various fruits, and vegetables.

—*Milliyen* (*circa* 1839)

Editorial

Chicago Architects of World Medicine: N. S. Davis I, James B. Herrick, and Ludvig Hektoen

FREDERICK STENN, M.D.

CHICAGO, ILLINOIS

THERE is a Hindu legend about an Indian prince who entered the temple of Buddha, prostrated himself and asked "How can I best serve my Maker?"

As he lay on the temple floor, he was touched gently on the shoulder and he heard a voice say "Arise." He rose and stood before a beautiful angel who said "Dost thou serve thy God?" He replied "Yes."

"Then go and serve thy fellow-man, minister to the sick, heal the afflicted, help those who are in distress." (Told by Victor C. Vaughan.)

The distinguishing feature of medicine as it has been practiced in every land and in every age is the fact that it has followed this sage advice.

This type of medical service falls into four categories. The first category concerns itself exclusively with providing service to the public. This group constitutes the vast number of physicians who serve quietly and nobly; they seek no recognition, no applause; they remain unknown outside their own practices. Their achievements live through their patients. To this grand unit belongs the revered country doctor, "Weelum" MacClure, so tenderly portrayed in *A Doctor of the Old School* by Ian MacLaren (John Watson).

The second category embraces the physicians who covet recognition for service not only to their patients but to the institution with which they work. Keeping the public and their fellow physicians acquainted with medical progress through voice or pen, faithfully serving on committees and boards, doing yeoman service to maintain the life of a useful organization, hospital or medical school — these are the duties that absorb their leisure. An example is Daniel Roberts Brower, renowned in his day, a voluminous writer and president of the Chicago and Illinois Medical Societies, but almost unheard of now, only fifty years after his death. Yet it is services such as these that have performed a gadfly's function in the development and improvement of medicine.

The third category is that of doctors who are determined to push back the frontiers of knowledge and to make an original contribution, however small, to the body of medical knowledge. In this group those attain their end who focus their attention for many years on a single isolated subject. This requires a man with an inquiring

mind, plus what Pasteur called "persistence of effort." Persons of this type live a century or so after their physical deaths; when this period has elapsed, their names are buried in oblivion, and only the discovery remains.

The highest category of all includes those who have discovered principles that altered the entire course of medicine; e.g., the discovery of the noble ethics of medicine by Hippocrates, of the psychiatric approach by Freud and of penicillin by Fleming. These leaders never die. Most of us can only follow in their paths, deviating but little from the course prescribed by them. But whether Father Time does or does not provide one with a seat in the Valhalla of medicine, however, is unimportant. What is important is the deed, the duty well done. When we speak of medical architects we have a large group to choose from, although none of them belongs in this highest category; beginning with the patriotic Fort Dearborn doctor, Isaac von Voorhis, and ending with fiery A. J. Carlson of recent days. For the purpose of this essay I select three men because of their nobility of character and their grandeur of achievement: Nathan Smith Davis I, James Bryan Herrick and Ludvig Hektoen.

Nathan Smith Davis I. — I spent the years of my early boyhood playing in a tiny park. This park was located in the depth of the poor stockyards district at Forty-fifth Street and Paulina in Chicago. It was built in May 1905, and everybody called it Davis Square. We children, Bohemian, German and Polish, took delight in its ball field, its tennis courts, its swimming pool and its gymnasium. I won many fist fights there, and I lost many too. I remember asking the policeman assigned there who Davis was. He said he did not know, but that he must have been very important. Years later I learned that the South Park Commissioners wisely named the park after an outstanding architect of world medicine. His name was Nathan Smith Davis. The thought never entered my mind that the day would come when I would have lunch with the grandson of Dr. Davis, Dr. Nathan Smith Davis III, and would talk with him about his illustrious grandfather.

This is the story. Dow Davis farmed land he had cleared of forest near the town of Greene, Chenango County, in the state of New York. He had seven children. The one born on Jan. 9, 1817, he named for his wife's uncle, Nathan Smith, and called him Nathan Smith Davis. (This name is not to be confused with that of the Nathan

During the months of 1960 and as long thereafter as possible, the editorial pages of the Journal of the International College of Surgeons *will be honored by presentations of rare and extraordinary historic value, the lectures presented at the International Surgeons' Hall of Fame on medical and surgical history from the earliest recorded achievements to those of our own times. We believe that* Journal *readers who were not able to attend the lectures will find them as exciting as did the audiences present at their delivery. The story of progress in the healing arts and the giants of medicine and surgery to whom we owe the amazing brilliance and scope of modern achievements is intrinsically thrilling and is a vital part of the education of every cultivated man and woman, inside or outside the profession. It is altogether fitting that it should appear in these pages, since the International College of Surgeons is first, last and always a teaching institution.*

Smith who founded Dartmouth Medical College.)

Young Davis was seven years old when one day, he recalled years later, he sat at the side of his dying mother. "She said to me that she wished me to be a good boy, to learn to worship God and to do good to my fellowmen. I promised her I would. Of course, I did not realize the importance or bearing of that promise at that early period of life; but an impression was made upon my mind, and from that day to this the rule of my life has been that whatever comes up that seems to be important and will improve my fellowmen, my impulse is to do what I can to help it along." After observing Nathan at the plough, looking half at the field ahead of him and half at the book in his right hand, Dow Davis concluded that his son must be given the advantage of education. So encouraged, Nathan entered the Cazenovia Seminary, a Methodist school, where he learned that real strength is the strength imparted by knowledge and industry. At the age of 17 he began the study of medicine by becoming, as every medical student of the time did, an apprentice to a reputable doctor. He took his preceptorship with a Dr. Clark of Chenango County and a Dr. Jackson of Binghamton, New York. Two years and nine months later—the year was 1837—he was graduated with honors from the distinguished College of Physicians and Surgeons of Western New York at Fairfield. He began practice at Binghamton. Here he put his debating skill to full use, as he represented the Broome County Medical Society at New York. During these early years he had an abundance of leisure to master Latin, botany, political economy and surgical anatomy, and he kept in close touch with the world medical literature.

One day he met John Evans, professor of obstetrics at Rush Medical College, at an American Medical Association meeting in Boston. Evans invited Davis to take the chair of physiology and pathology at Rush. Davis accepted and joined this great medical college just six years after it opened on North Dearborn and Indiana Streets in Chicago.

For the next half century, from 1849 to 1904, Chicago was the field of his operations. His contributions during this period labeled him an outstanding medical leader.

The achievement for which he took his place in the medical hall of fame lay in the field of medical education. In this respect he followed the road paved by John Drake, and paved the way for Abraham Flexner. The medicine of early America was the medicine of Edinburgh.

Abroad, as here, the preceptor was the pivot of medical education. The preceptor was a physician who had attained a considerable practice and who had a reputation as a good teacher. He took as an apprentice a student who was not uncommonly as young as 15 or 16. For two or three years he taught him the practical and theoretical aspects of the art, and what little was known then of the science of medicine. If his practice was large and if he had the special gift of teaching he took on several apprentices, each of whom paid for the instruction. It was simple for such a practitioner to open up a medical school with himself the only professor, as Nathan Smith did at Dartmouth. Such a medical school consisted of a lecture room, a dissection room and a room for studying botany. Frequently several preceptors pooled their mutual interests and expanded these facilities. The student himself may or may not have been a graduate of high school. In one year he took a course of instruction lasting fourteen weeks; the next year the same course was repeated. The subjects were anatomy, surgery, chemistry, materia medica and pharmacy, the theory and practice of medicine, botany, and natural and experimental philosophy. The exami-

nation was held at the end of the second course. If he passed, the student had to present written evidence of service to a medical preceptor and write a thesis before he was entitled to practice in the community. This was the method of teaching practiced by our most noted doctors; including Thomas Bond, John Redman, Caspar Wistar, Samuel Bard and John Warren.

Davis, however, objected to such paltry training for so vast a responsibility as the doctor undertakes. He began to enunciate his ideas as early as 1844. He proposed an adequate preliminary education. He insisted on a graded course of instruction by which the more complex studies were pursued later in the semester, and on a prolongation of the course of instruction. He demanded examinations at the end of each teaching year. Whatever merit these proposals had, no medical school was willing to adopt them, for fear it would lose students to competitive medical schools. There was only one answer: to call a national convention, with delegates from medical schools and medical societies, to exchange views on educational matters for the benefit of medicine.

After violent opposition Davis brought together such a convention. It was first held in New York and later (in May 1847) in Philadelphia, where delegates gathered from medical societies and medical colleges all over the country. Davis thus became the father of the American Medical Association, and he remained its chief helmsman for the rest of the century. In its early meetings he hammered away at the importance of improving the standards of medical schools, but his efforts bore no fruit. He was an untiring, unyielding, irrepressible and intractable zealot who, like the mythical Briareus, grew stronger as his opposition became greater. Deeds do not come from the tongue, he thought; the way to get something done is to do it, and the way to start is to start. His opportunity came at Rush, where he encountered a warrior as iron-willed as himself in the imperious autocrat, Daniel Brainard. The two fought each other as Achilles and Hector did, with clashing bronze. Brainard crushed Davis' proposals for improved medical education at Rush. Davis, however, was not to be crushed. With Hosmer Johnson, W. H. Byford, David Rutter, Edmund Andrews and Ralph Isham, Davis broke camp at Rush and promptly formed the Chicago Medical College, later Northwestern University Medical School, in 1859. He put into immediate effect the program closest to his heart. The student had to be 21 years of age before he could practice medicine; he had to be of good moral character; he had to study medicine for three years. Davis enlarged the faculty to include the several specialties and prolonged the term to five months, grading the studies progressively.

The *Chicago Medical Journal*, a Rush organ, dubbed Davis' College a reform school and called Davis himself an apostle. The *New Orleans Medical News* said the program was a waste of time. The *Cleveland Medical Gazette* expressed the opinion that the student learned best who heard the same lectures repeatedly. This adverse publicity had the favorable effect of awakening sound criticism all over the country. Within a few years the New York Medical College and Hospital for Women, then the St. Louis College of Physicians and Surgeons and finally, in 1871, Harvard, Rush and the University of Pennsylvania following, all adopted Davis' plan. The medical schools in England, Scotland, France, Germany, India and Japan fell into line. Northwestern University Medical School was proud of its founder.

A medical man, after waiting some time for an interview, asked Davis if he had ten minutes to spare. Davis replied testily, "I have not had ten minutes to spare for the

last ten years, and I do not expect to have in the next ten to come." He founded the Mercy Hospital, the Chicago Historical Society, the Chicago Academy of Sciences, the Chicago Relief and Air Society, the Washington Home for Alcoholism, the Chicago Medical Society, the Illinois State Medical Society and the Association of Medical Colleges. He wrote the code of ethics of the American Medical Association. He edited several medical journals, including the Journal of the American Medical Association. He taught medical jurisprudence at the Law School, the Bible at his church and medicine at Northwestern University Medical School. He wrote a text on medicine, a history of medicine and a history of medical education and he fostered a world-wide temperance movement. He attended to a vast practice, and he was a loving husband and a devoted father. Could any man boast of more useful achievements?

He was a typical old-time practitioner, wearing a high black silk hat and a swallowtail coat. He was tall, wiry and stooped. His eyes were alert, serious and determined. His pursed lips stood out sharply against a heavy beard. At times rancorous, vindictive, irascible and brusque, he was understanding, kind and ever thoughtful of others. The Bible was his favorite book, and he knew it as few did, from Genesis to Revelations.

Frank Billings was impressed by Davis' tenacity of purpose. At his testimonial dinner in 1901, Davis remarked: "My old friend A. B. Palmer said once that I had been harping on the same thing for twenty years. My only answer to him was 'If it is right and will benefit mankind, harp on it, not only twenty, but forty years, until it is done.'"

James B. Herrick.—In 1931 my fellow students at Rush Medical College told me to matriculate for the course in cardiology given by James B. Herrick. We were all seated quietly but anxiously in the amphitheatre on Harrison Street when the class bell rang. We expected to see a large man of the stature of Billings or Bevan, but there before us stood a small man. He was a professor through and through—grave, modest and learned. He carried a cane hooked over his right wrist, wore a distinguished beard and was neatly dressed. His bright eyes swept quickly across the class as he began to talk. He spoke in a way entirely strange to us. He used impeccable English with precise diction. His lucid thinking suggested Marcus Aurelius; his enthusiasm increased as he lectured. He illustrated his points with the experiences of great doctors of the past, like Allan Burns or Corrigan, or with those of his contemporaries, like Osler or Rolleston. He paused in describing the murmur of aortic regurgitation to tell us about the faithless Cressida in Shakespeare's *Troilus and Cressida.* He called upon Virgil, Trollope, Dryden, Bacon, Thackeray, Lamb, Moliére and Lowell as he outlined the main features of acute rheumatic fever or of congenital malformations of the aorta. I was intoxicated with his brilliance and left the lecture room mumbling, "What a master-teacher!"

Dr. Herrick's mother was Dora Kettlestrings. She came from an old Yorkshire family that pioneered in the community of Oak Park, Illinois. His great-grandfather was a soldier in the Revolutionary War, and his father, Orrigan Herrick, operated a sawmill on the Des Plaines River. James Bryan Herrick was born in Oak Park on Aug. 11, 1861, and he remembered clearly the funeral procession of Abraham Lincoln and his meeting with General Sherman. The sport he loved as a boy was the use of the slingshot, and, like Ramon y Cajal, he boasted of his prowess in its use. His pleasure, nevertheless, he found in books. He stuffed into his pockets or placed under his pillow copies of Aldrich's *Story of a*

Bad Boy, or of the tales of Horatio Alger, Oliver Optic and Captain Mayne Reed.

In 1877 he was graduated from the first class in Oak Park High School. By this time his parents, appreciating his aptitude in classical studies, sent him to the Rock River Seminary at Mt. Morris, Illinois. Here his teacher, Richard A. Edwards, introduced him to the beauty revealed in Cicero, Xenophon, Longfellow and Tennyson. He learned, too, the art of oral expression and loved to listen to great orators like Henry Ward Beecher, Woodrow Wilson and George E. Vincent, but admired most, and in later years tried to mimic, Wendell Phillips. He entered the University of Michigan at Ann Arbor, where he fell under the charm of another English scholar — this time Moses Coit Tyler, who wrote a great classic on pre-Civil war literature. Tyler told his class one day that any student who purchased the three volumes of Chaucer and read its 50,000 lines would be excused from the semester examination. Herrick was excused! From that day on he read Chaucer with such zeal and regularity that he unconsciously took on the simple style, the gentle humor and the bright outlook of his favorite story-teller. The Peoria High School offered him the position of teacher of English, but he found himself teaching Greek, Latin, German and Science. His alma mater, Oak Park High School, sought his pedagogic services, too. While here, he demonstrated, on one occasion, to his surprised but delighted pupils the living organs of an anesthetized dog. The local anticruelty society put a quick end to this barbarous assault upon propriety. The school principal, B. L. Dodge, however, said "Go into medicine; be your own master; don't work for hire for anybody else. Herrick, you'll succeed."

Herrick rejected offers to become a foreign missionary or to become associated with an insurance company. With the guidance of his family doctor, John W. Tope, he entered Rush Medical College. He was already married to the lovely, steadfast Zellah P. Davies of Oak Park. He studied for a total of two years of twenty weeks each, with laboratory work only in anatomy and chemistry. His internship at Cook County Hospital brought him into close relations with the attending staff—giants in Chicago medicine: Christian Fenger, Norman Bridge, P. J. Rowan and Nicholas Senn. While still an intern he directed J. B. Murphy's attention to acute appendicitis and, with Hektoen, demonstrated the tubercle bacillus for the first time at County Hospital. By 1889 he had become a general practitioner on California and Warren Avenues. He was one of the first in Chicago to use diphtheria antitoxin.

The need for further training impelled him to study in Prague with Rudolph Von Jaksch and Hans Chiari. It was Chiari who lighted within him the flame of cardiology. Herrick was impressed with the cultured Adolph von Strumpbell and delighted with the clinics of Von Ziemssen and Von Winckel at Munich, as well as with Erb in Heidelberg. He was fascinated by Wilhelm Leube at Wurzburg, largely because of the excellence of his volumes on clinical diagnosis. Persuaded by his friends to follow a research career, he studied in the department of chemistry at the University of Chicago at the age of 43, and later with Emil Fischer in Berlin. These experiences, however, only made it clear to him that he belonged in clinical medicine; so in 1910 he became a specialist in internal medicine and cardiology.

Herrick takes his place in the medical hall of fame because he brought the world's attention to coronary thrombosis. This is one of the great medical achievements of the past hundred years. It all started as early as 1768, when William Heberden gave a splendid description of

angina pectoris. His successors, John Fathergill, Caleb Hillier Parry and Edward Jenner, associated the pain of angina pectoris with sclerotic coronary arteries, though some, like Clifford Allbutt, sought the origin of the pain in the aorta. The sudden death of the eminent John Hunter after an anginal attack in 1793 and the observation at autopsy of his ossified coronary arteries went a long way toward directing studies on the arteries of the heart. The famous Danish sculptor Bertel Thorwaldsen died in a theatre in Copenhagen in 1844 of a thrombosis or "plug" in a coronary artery. Peter Ludwig Panum of Copenhagen, also a professor of physiology, became ill with pain in the chest on walking against the wind in 1885. The pain tore through his chest and ran to the left arm and fingers. The pulse became rapid, faint and irregular, and he vomited. He died fourteen hours later of a thrombus in the left coronary artery, with softening of the left ventricle and rupture. This death must have made a profound impression upon young Herrick, because Christian Fenger, his attending man at County, was Panum's student, and Fenger, during his many informal dressing-room conferences, no doubt referred to his beloved teacher.

Oliver Wendell Holmes wrote his immortal observations on puerperal fever purely from a study of the literature. Herrick, too, had an excellent literary understanding of diseases of the coronary artery long before he encountered his first case. Herrick followed closely the many reports in the literature on myocardial muscle following occlusion of the coronary artery. He read Marshall Hall's work of 1842, Richard Quain's of 1850, Karl Weigert's of 1880, Ernest Ziegler's of 1881, Mulius Cohnheim's and Sculthess Rechberg's of 1881 and Ernest Leyden's of 1884. He was swayed by Hektoen's observation in 1890 of sudden death due to embolism of the left coronary artery and remembered Hektoen's telling his class that occlusion of the coronary artery is not an infrequent cause of sudden death. He noted especially the reports of George Dock in 1896 on four patients with acute coronary thrombosis on whom autopsies were done. He took heed of Rene Marie's monograph *L'Infarctus du Myocarde* in 1896.

Herrick's first clinical diagnosis of coronary thrombosis occurred thus: A slender man aged 55, head of a bank, returned with his wife to their suburban home from a theatre in Chicago on the evening of Jan. 16, 1910. That midnight he ate a sandwich and drank a bottle of beer. A severe pain developed in the lower precordial area. He became nauseated and, thinking that it was the food that disagreed with him, induced vomiting by tickling his throat. The pain continued. The family doctor, L. W. Bremmerman, found his patient cold and nauseated, with a small, rapid pulse. He washed out the stomach and gave morphine. The pain continued for three more hours, after which rales appeared in the chest. Dr. Herrick was called nine hours later. The patient's mind was clear, but his color was cyanotic and his breathing dyspneic. His chest was full of moist rales. His pulse was feeble, and beat 140 times per minute, and the heart tones were faint. His condition was so alarming that the doctors called in Frank Billings. Billings was puzzled but thought of acute dilatation of the heart. The possibility of an acute surgical disease of the abdomen brought John B. Murphy to the bedside. Murphy wondered whether it was an acute pneumothorax. The patient's abdomen became distended, albumin and casts appeared in the urine, and projectile vomiting followed. Dr. Herrick and Dr. Murphy slept in a large room next to the patient's but neither could sleep well. The patient rolled from side to side, jumped out of bed, dodged the

nurse and ran to the bathroom to vomit. His pulse was almost imperceptible.

Murphy whispered, "Herrick, are you awake? Say, are you sure about there being no pneumothorax?" Herrick whispered, "Dr. Murphy, do you think this might be acute pancreatitis or possibly a strangulated diaphragmatic hernia?" The pain continued in the patient's chest with varying degrees of intensity. He died fifty-two hours after the onset, on January 18 at 4 A. M.

Dr. Ludvig Hektoen did the autopsy at home. Wrote Herrick: "I was unable to be present. Dr. Hektoen asked me over the telephone what he might expect to find. My reply was 'Look for a clot in the coronary. If you don't find that, find a perforated gall bladder or a perforating duodenal ulcer, hemorrhagic pancreatitis, hemorrhage into the adrenals, strangulated hernia, ruptured pleura or any other accident you know about.' Dr. Hektoen, with the dry humor for which he is well known, with much courtesy thanked me for giving him such a great variety to choose from. He called me up that evening and said: 'The clot was in the coronary artery, all right. But how in God's name did you guess?'" Postmorten examination revealed a red thrombus at a point of sclerotic narrowing in the left coronary artery, causing reddish and yellowish areas of softening in the left ventricle and the interventricular septum.

Herrick reported this case at a meeting of the American Medical Association in St. Louis in 1910, and he observed a second patient later that year. In May 1911 he spoke again, this time on pain in disease of the heart, before the Iowa State Medical Society. Fortified with data based on one autopsy and five other cases, he presented his observations formally before the Illustrious Association of American Physicians. He aroused not even a gleam of interest.

Herrick was as much convinced that he had found a truth as had Semmelweiss been a half century before. He was doubly persuaded to this conviction by another case that fortunately came to his attention. Herrick talked and talked coronary thrombosis before student bodies, before medical societies, before scientific bodies, before groups of doctors. Charles Mayo sat unmoved in one of these audiences. Herrick presented another paper in 1917, this time with Nuzum before the A. M. A. meeting in New York; the reception was just as cold.

At about this time Mrs. Cyrus McCormick donated to the Presbyterian Hospital a Cambridge electrocardiographic apparatus, which Dr. F. M. Smith and Dr. Edwin M. Miller used after ligating the coronary arteries of dogs. They observed the electrocardiographic changes Herrick had observed in a patient who died of coronary thrombosis. For the second time Herrick appeared before the Association of American Physicians, determined to make his audience listen. This time he was armed with two more cases with postmortem studies.

When he said he had corroborating evidence based on experiments with dogs, the audience was immediately impressed. All these years Herrick had been reporting evidence based on human studies. Why were canine studies more scientific? He smiled. The date was 1918, eight years after his original report.

If we examine the textbooks of medicine and look through the reference catalogues such as the *Cumulative Index* or the *Surgeon General's Catalogue*, we discover that most countries did not take coronary thrombosis seriously until 1925. Why was coronary thrombosis so slow to be recognized, when its characteristic features were presented seventy years before Herrick's classical paper?

Why, too, may we ask, was acute appen-

dicitis so slow to be recognized? Lorenz Heister, we remember, reported appendicitis in 1711, and one hundred and seventy-five years elapsed before Reginald Fitz again brought it to the attention of the world. Ideas born before their time are as seeds fallen among stones.

To whom must we give credit for a discovery: the person who first discovered the phenomenon, or the person who popularized it and put it to use? Shall we give the credit to George Dock, to Obrastow and Strachesko, to William Osler and to a dozen others, each of whom has added to our early understanding of coronary thrombosis? Or shall we give an overwhelming vote to the man who spent the greater part of his life continuously stressing its importance?

The public answered this question by honoring Dr. Herrick with the highest honors that can be awarded a physician: the Kober Medal of the Association of American Physicians and the Distinguished Service Medal of the American Medical Association.

Coronary thrombosis was not his only field of endeavor. He founded the Society of Internal Medicine of Chicago. He founded the Chicago Heart Association. He directed the course of the McCormick Institute for Infectious Diseases and the Lewis Institute. He discovered sickle cell anemia. He wrote *A Short History of Cardiology* and *Memories of Eighty Years.* He taught for forty years at Cook County and at Rush.

His long training in the autopsy room, at the bedside and in the library was responsible for his profound capacity for critical observation. This quality entitled him to the epithet Henry A. Christian accorded him, "the dean of clinicians."

Ludvig Hektoen.—In 1936 my pathology professor H. Gideon Wells, suggested that I work with his teacher, Ludvig Hektoen. As a student assistant I came to know Dr. Hektoen. He worked in the McCormick Institute, now the Hektoen Institute for Medical Research. Its rooms were worn but scrupulously tidy. His desk had nothing on it but a pencil and a ruler. The general quiet about the place gave the impression that here was a man with an abundance of leisure. He was a small man like Herrick, about 140 pounds in weight and 5 feet 9 inches tall, with snow-white glistening hair that emphasized his kindly, bronzed Norwegian features. His manner was so obliging and his smile so gracious that I always forgot I was in the presence of a man of international fame.

His life story is this. Olave Thorsgaard was descended from a well-to-do family of Ringbut, Norway. Her parents settled in southeastern Wisconsin, in a place called Coon Prairie. Here she met and married a parochial school teacher, Peder P. Hektoen, whose parents came from Tynset, Norway. They set up their home in the town of Westby, where their first child, Ludvig, was born on July 2, 1863. Ludvig Hektoen was reared in a home poor in adornment but rich in humility. His mother and father were pious, loving and genuine. He studied in the district school where his father taught, and he attended Monona Academy on Lake Monona, Wisconsin, earning part of his expense by chopping wood for a teacher. With the ministry selected as his future profession, he entered Luther College, a Norwegian university in Decorah, Iowa. He learned Latin, Greek and German and so thoroughly mastered Norwegian that Norse literature was his love for the rest of his life. He particularly admired Scandinavian mythology, especially the myth of Mimer, who, on drinking water from his well, obtained knowledge of all things past and future. His beloved Hebrew teacher, Laur Larsen, taught him sincerity, regularity, application, devotion to duty and, above all, love of learning.

He delivered the valedictory address in 1883. Two years earlier the family doctor, Johan Schriener, had encouraged Ludvig to enter medicine. At the University of Wisconsin he trained with, among others, William Trelease, a meticulous research botanist and a pioneer in the teaching of bacteriology. Needing matriculation money for medical school, Hektoen did postmortem work at the present Winnebago State Hospital. In 1885 he selected the College of Physicians and Surgeons of Chicago as his school because its faculty consisted of three Wisconsin men, Senn, King and Palmer. The only laboratory training there was in chemistry. He recalled that the teacher of hygiene, Romaine Curtis, was asked by the faculty to resign because of his insistence that germs were capable of causing disease. He later recalled that a student, A. P. Ohlmacher, was driven out of the class because he wasted the students' time demonstrating the use of the first microscope seen in the school. Hektoen became the valedictorian again, with Nicholas Senn delivering the commencement address. In 1887 Hektoen was appointed apothecary to the Illinois Eastern Hospital for the Insane at Kankakee, but in reality did the autopsies. Like Herrick, he took first place in the examinations at Cook County Hospital. Fenger could have found no more revering intern, for Fenger was just another Laur Larsen — brusque but genuine and inspiring. Hektoen asked Fenger one day what branch of medicine he should enter. "Well, what field do you want to enter?" Fenger asked. "Pathology," Hektoen answered. And pathology it was.

Nicholas Senn assisted Hektoen in becoming curator and lecturer in pathology at Rush. This appointment prepared him for the position of coroner's physician and finally pathologist at Cook County Hospital. Before the next twenty years had passed he accumulated a gigantic experience, having done some ten thousand autopsies, including that of the assassinated Mayor Carter Harrison. By the opening of the twentieth century he stood shoulder to shoulder with William H. Welch, W. T. Councilman, Simon Flexner, T. Mitchell Prudden and Reginald Fitz. The University of Iowa offered him the position of dean. William Osler asked him to take the chair of pathology at the University of Pennsylvania. The College of Physicians and Surgeons wanted him back. But he joined the faculty at Rush and the University of Chicago, occupying a chair in pathology for the rest of his long life.

The field in which Dr. Hektoen was especially noted was immunology, which he pursued vigorously for some fifty years. Whenever you visited him, you found him surrounded with dozens of racks containing hundreds of tiny glass tubes. He studied in marvelous detail the antibodies associated with the opsonin reaction, the precipitin reaction and the agglutination reaction. His discoveries in this field comprise the backbone of our knowledge of resistance to infection. The specific study that brought him world fame, however, was that concerning the agglutination reaction against red blood cells. This interest led to his discovery of the crossmatching of blood before transfusion, a momentous discovery. This simple technic of matching blood to make sure bloods were compatible was adopted by every hospital and laboratory in the world, whether the Tahlevi Hospital in Teheran, Iran, the Mayo Hospital in Lahore, Pakistan, the University Hospital of Istanbul, the Royal Infirmary of Edinburgh, the University of Guayaquil in Chile or the Kyoto University Medical School of Kyoto, Japan. Few people knew that Hektoen had made the original discovery.

As a bacteriologist, he proved that the ray fungus is responsible for actinomycosis, that bacteria can be cultivated from

the blood of patients, with typhoid, scarlet fever and other infectious diseases, and that measles can be produced experimentally in man. He proved the value of multiple vaccines, antogenous vaccines and convalescent serums and encouraged the use of tuberculin immunization. He started George and Gladys Dick on their course toward the discovery of the causes and treatment of scarlet fever. He laid the foundation for the development of a specific vaccine against poliomyelitis by studying this infection from all its aspects and publishing, with Miss Ella Salmonsen and Dr. Morris Fishbein, a voluminous bibliography of this disease. As a pathologist he held that physician guilty of default who failed to do necropsies or have them done. He devised the system adopted by the Institute of Medicine of Chicago and the American Medical Association for the grading of hospitals in accordance with the percentage of postmortem studies. He fought incompetence in the coroner's office in Chicago, and he backed up William F. Petersen's idea of an Institute of Legal Medicine in Illinois. As a research man, he trained at the McCormick Institute several hundred students who themselves became teachers and leaders of research in bacteriology, pathology, public health, medical history, medical writing and medical education. He guided the research activities of innumerable investigators both here and abroad.

As a medical administrator he was chairman of the National Research Council, active in the Committee for Scientific Research of the American Medical Association, a director of the American Cancer Society, a director of the National Cancer Advisory Council, Chairman of the Chicago Cancer Committee and President of the Chicago Tumor Institute. He smote the country with his numerous speeches and papers on the necessity of making every doctor's office a detection center for carcinoma, on the need of early attention for every carcinoma and on the importance of providing the best possible services in the therapy of carcinoma, regardless of cost. He guided the policies of the John Crerar Library, of the Visiting Nurses Association and of the Welfare Council of Metropolitan Chicago, and he was the very heart of the Institute of Medicine of Chicago, to say nothing of his basic role in the Chicago Institute for Psycho-Analysis, the Society of the History of Medicine and the Cook County School of Nursing. His life was overflowing with conferences all over the country, on diabetes, genetics, highway research, ambulance service, dental research, the management of tuberculosis and dozens of related fields. It can be said with truth there was very little of medical importance that went on in Chicago in which Hektoen did not have a hand during his active years, and much of what transpired in other sections of the country owed their course to his direction. History hardly provides a better example of a medical mentor. As an editor of the *Archives of Pathology* and the *Journal of Infectious Diseases* and as author of innumerable editorials and book reviews, he became a watchdog of the literature, inveighing against prolixity, repetition, duplication and fuzziness in writing. His aphorisms were golden nuggets: "Keep your eyes not on what is seen, but on what is unseen; for what is seen is transitory, but what is unseen is eternal." "Doubt, not faith, is the beginning of wisdom." "The art of discovering consists in habitually searching for the causes and meaning of everything which occurs."

Oppressed with an unhappy domestic life, wealthy but neither knowing it nor showing it, Hektoen became as fine a devotee of Aesculapius as the world has seen anywhere. "I expect to pass this world but once," he said to a contemporary.

"Any good, therefore, that I can do, or any kindness that I can show to any fellow creature, let me do it now. Let me not defer or neglect it, for I shall not pass this way again."

Each of these three men, Davis, Herrick and Hektoen, important leaders though they were, was one of a battalion of scientists. Each was only a small part of a broad movement in medicine and society.

As an organizer, Davis must share honors with Daniel Brainard, John Evans, Max Thorek and Frank Billings. As a clinician, Herrick must share glory with William Quine, Rollin Woodyatt, Isaac Abt and Bertram Sippy. As an investigator, Hektoen must share fame with George and Gladys Dick, A. J. Carlson, Nicholas Senn, H. Gideon Wells, and Arno Luckhardt.

Chicago has already expressed its appreciation for this triumvirate by naming a park after Davis, a public school after Herrick and a visiting nurse station after Hektoen. We too, in medicine, can express our debt. The library of Sir Henry Acland was adorned with a beautiful panel bearing the portraits of Linacre, Harvey and Sydenham—Linacre representing literature, Harvey science and Sydenham practice. A similar panel could be set up in the International Surgeons' Hall of Fame: Davis representing society, Herrick the bedside and Hektoen the laboratory.

Statues of these and similar men and woman could be set up in our medical centers and parks as fitting memorials to their lives, their long devotion to a single principle, their burning fervor, their untiring industry, their stubborn determination and their magnanimous humanity. May our lives be guided as theirs was, by that ancient maxim: *Ut Prosim* (that I may do good!).

BIBLIOGRAPHY

Arey, L. B.: Northwestern University Medical School 1859-1959; Northwestern University, Evanston and Chicago, 1959.

Bay, J. C.: James B. Herrick: Youth in Man Makes History, Proc. Inst. Med. Chicago 14:288, 1942.

Bonner, T. N.: Dr. Nathan Smith Davis and The Growth of Chicago Medicine, 1860-1900, Bull. Hist. Med. 26:360, 1952.

Editorial, Boston Medical & Surgical Journal, 1837.

Carr, E.: The Northwestern University Medical School and the Graded Curriculum, Boston M. J. 15:56, 1941.

Danforth, I. N.: The Life of Nathan Smith Davis (1817-1904). Chicago: The Cleveland Press, 1907.

Davis, N. S.: History of Medicine, with the Code of Medical Ethics. Chicago: Cleveland Press, 1903. Contributious to the History of Medical Education and Medical Institutions in the United States of America, 1776-1876. Special Report prepared for the United States Bureau of Education. Washington: U. S. Government Printing Office, 1877. History of Medical Education and Institutions in the United States from the First Settlement of the British Colonies to the year 1850. Chicago: S. C. Griggs & Co., 1850.

Fishbein, M.: A History of the American Medical Association 1847 to 1947. Philadelphia: The W. B. Saunders Co., 1947. Ludvig Hektoen: A Biography and Appreciation, Arch. Path. 26:1, 1938.

Herrick, J. B.: A Short History of Cardiology. Springfield, Ill.: Charles C Thomas, Publisher, 1942. An Intimate Account of My Early Experience with Coronary Thrombosis, Am. Heart J. 27:1, 1944. N. S. Davis, Bull. Soc. Med. Hist. Chicago 4:40, 1935. Clinical Features of Sudden Obstruction of the Coronary Arteries, J.A.M.A. 54:2015, 1912. Thrombosis of the Coronary Arteries, ibid. 72:387, 1919. Obiter Dicta Medica, Chicago Literary Club, Jan. 9, 1926. Why I Read Chaucer at Seventy, Tr. A. Amer. Physicians 46:13, 1931. Memories of Eighty Years. Chicago: The University of Chicago Press, 1949. An Intimate Account of My Experiences with Coronary Thrombosis, Am. Heart J. 27:1, 1941.

Holmes, W. H.: James Bryan Herrick. Privately printed, November 1935.

Ingals, E. F.: Angina Pectoris, Proc. Inst. Med. Chicago 2:50, 1918.

Le Count, E. R.: Pathology of Angina Pectoris, Proc. Inst. Med. Chicago 2:65, 1918.

Obrastzow, W. P., and Straschesko, N. D.: Zur Kenntnis der Thrombose der Coronararterien des Herzens, Ztschr. f. klin. Med. 71:116, 1910.

Stenn, F.: The Life and Times of Ludvig Hektoen, to be published. Hektoen, Ludvig, Private Letters, John Crerar Library.

Thacher, J.: American Medical Biography, or Memories of Eminent Physicians who have flourished in America. Boston: Richardson & Lord, 1828.

New Books

BOOKS RECEIVED

The following books have been received by the Editor; they will be reviewed critically as space and facilities permit. Omission of more extended review, however, is not to be taken as criticism of the merit of the book.

The Intestinal Tract: Structure, Function and Pathology in Terms of the Basic Sciences. By Richard Paul Spencer. Springfield, Ill.: Charles C Thomas, Publisher, 1960. Pp. 398. *Reviewed in this issue.*

Henry E. Sigerist on the Sociology of Medicine. Edited by Milton I. Roemer, Research, Sloan Institute of Hospital Administration, Cornell University. With a foreword by James M. Mackintosh. New York: MD Publications, Inc., 1960. Pp. 397. *Reviewed in this issue.*

Fundamental Techniques of Plastic Surgery and Their Surgical Applications. By Ian A. McGregor, with a foreword by C. F. W. Illingworth. Edinburgh and London: E. and S. Livingston, Ltd., Williams and Wilkins Company, and Baltimore: The Williams and Wilkins Company (exclusive U.S. Agents), 1960. *Reviewed in this issue.*

Cosmetic Surgery: Principles and Practice. By Samuel Fomon. Philadelphia: The J. B. Lippincott Company, 1960. Pp. 651, with 608 illustrations. *Reviewed in this issue.*

General Anesthesia in Dental Practice. By Leonard M. Monheim. St. Louis: The C. V. Mosby Company, 1960. Pp. 461, with 114 illustrations. *Reviewed in this issue.*

Upper Digestive Tract. Part I of Vol. 3, Digestive System, The CIBA Collection of Medical Illustrations. By Frank H. Netter. New York: Ciba Pharmaceutical Products, Inc., 1959. Pp. 206, with 172 full-color plates. *Reviewed in this issue.*

Functional Bracing of the Upper Extremities. By Miles H. Anderson. Springfield, Ill.: Charles C Thomas, Publisher, 1958. Pp. 463. Illustrated.

Spinal Cord Compression. By I. M. Tarlov. Springfield, Ill.: Charles C Thomas, Publisher, 1957. Pp. 147, with 41 illustrations.

Le risque operatoire en chirurgie biliopancreatique (The Operative Risk in Biliary Surgery). By Yves Salembier. Paris: Masson et Cie, 1959. Pp. 260, with 2 illustrations.

Le Diagnostic du Cancer d'Estomac a la Periode Utile (Diagnosis of Carcinoma of the Stomach at the Time Most Favorable for Treatment). By Rene A. Gutmann. Paris: G. Doin et Cie, 1956. Pp. 257.

Operative Surgery. Edited by Charles Rob and Rodney Smith. London: Butterworth & Co., Ltd.; Philadelphia, F. A. Davis Co., 1956. Vols. 1 and 2 of 8 (plus index). Profusely illustrated.

The Clinical Management of Varicose Veins. By David Woolfolk Barrow. New York: Paul B. Hoeber, 1957. Pp. 167, with 70 illustrations.

Pathology and Surgery of the Veins of the Lower Limbs. By Harold Dodd and Frank Cockett. Baltimore: The Williams & Wilkins Company, 1957. Pp. 462, illustrated.

The Surgeon's Tale: The Story of Modern Surgery. By Robert G. Richardson. New York: Charles Scribner's Sons, 1959. Pp. 227, with 45 illustrations.

History of American Medicine. Edited by Felix Marti-Ibanez. New York: MD Publications (MD International Symposia), 1959. Pp. 181.

The Surgical Treatment of Facial Injuries. By Varaztad Hovhannes Kazanjian and John Marquis Converse. Baltimore: The Williams and Wilkins Company, 1959.

Upper Digestive Tract. Part I of Vol. 3, Digestive System, The CIBA Collection of Medical Illustrations. By Frank H. Netter. New York: Ciba Pharmaceutical Products, Inc., 1959. Pp. 206, with 172 full-color plates.

This second volume in a series of three devoted to the digestive system is a collection of magnificent reproductions of oil paintings illustrating the anatomic structures, diseases, and some functional and diagnostic aspects of the upper part of the intestinal tract.

The artist consulted with many world-renowned authorities in the preparation of these illustrations, including William H. Bachrach, University of California; John Franklin Huber, Temple University, Philadelphia; Nicholas A. Michels, Jefferson Medical College, Philadelphia; G. A. G. Mitchell, University of Manchester (England); Rudolph Nissen, University of Basel (Switzerland); Max L. Som, New York University Post-Graduate Medical School; Leo Stern, Mount Sinai Hospital, New York; Bernard S. Wolf, Columbia University; and Gerhard Wolf-Heidegger, University of Basel.

The basic drawing for the illustrations is meticulous and the color reproduction splendid. The accompanying text is concise and lucid. The material is arranged in seven parts, dealing anatomically with mouth and pharynx, the esophagus, and the stomach and duodenum; functional and diagnostic aspects of the upper digestive tract, and diseases of the mouth and pharynx, the esophagus and the stomach and duodenum.

Part 3, on the liver, biliary tract and pancreas, was published in 1957. Part 2, dealing with the lower part of the digestive tract, is in preparation and is scheduled for publication in 1961.

The whole set is recommended as a handsome and informative addition to every surgeon's library.

M. T.

Les Cervicites et Leur Traitement par la Papaïne-Pénicilline (Treatment of Cervicitis with Papain-Penicillin). By Manadou Bah. Bordeaux: A. Baillet, 1958. Pp. 106, with 43 illustrations.

This book deals with the treatment of cervicitis by local application of papain-penicillin solution. It is based on the case histories of 25 patients selected from a large group treated by Prof. Magendie in Bordeaux and by Dr. Mamadou Bah in Dinguiraye, Guinea. The anatomopathologic classification includes simple erythematous, ulcerative, granular, polypoid, villous, sclerotic, glandular and leukoplakial lesions. The practical classification consists of exocervicitis, endocervicitis and mixed cervicitis in both the acute and the chronic form. Nineteen schematic drawings depict the various pathologic aspects of cervicitis as seen through the colposcope and include many common and bizarre types.

The author offers a new local treatment for cervicitis, which combines the proteolytic enzyme action of papain with the antibiotic action of penicillin. The solution consists of papain, 0.20 Gm., and penicillin, 300,000 units, dissolved in 20 to 40 cc. of physiologic solution of sodium chloride. The cervix is cleansed with 2 per cent acetic acid and a piece of gauze immersed in 15 cc. of this solution is inserted against the cervix and left in place for twelve hours.

Papain possesses a specific detergent action on dead or dying cells. Its mild caustic action separates dead from living cells and its hydrosolubility assures penetration into these cells; and this treatment is not followed by scar formation. Penicillin exerts a reinforced antibiotic action, (1) local and (2) general, owing to reabsorption by the vaginal mucosa. Five minor local reactions occurred among the 25 patients treated and were attributed to too highly concentrated solutions. There were no toxic reactions. Results were good when this solution was applied in cases of simple exocervicitis, and

regeneration of the mucosa occurred within a month. Failures occurred in treating vegetative exocervicitis, endocervicitis due to pathologic lesions of the uterus and adnexa and trichomonas vaginitis. Persistent vegetative forms of exocervicitis required fulguration of villi, polypi, leukoplakial plaques, excrescences, etc., to effect cure. The proteolytic and antibiotic action of preliminary papain-penicillin therapy facilitated cure by electrocoagulation.

The author observed relief in some patients with endocervicitis secondary to endometritis and salpingitis after treatment of the infected cervix with papain-penicillin. This had not been anticipated and was attributed to the fact that, in these inflammatory lesions at a higher level, infection was maintained by the infected cervix. Furthermore, penicillin, having been reabsorbed by the vaginal mucosa, exerted a general antibiotic action on all the genital organs. They noted particularly good results in African women who had not been given prior antibiotic treatment.

This new and ingenious treatment of cervicitis has merit. The author clearly defines its indications and limitations. The case histories are well presented and accompanied by schematic drawings of the various lesions as seen through the colposcope. There is an extensive bibliography on cervicitis and subjects germane to papain-penicillin treatment.

CHARLES PIERRE MATHÉ, M.D.

General Anesthesia in Dental Practice. By Leonard M. Monheim. St. Louis: The C. V. Mosby Company, 1960. Pp. 461, with 114 illustrations.

The author, with the assistance of four contributing authors, has covered the entire field of general anesthesia for Dentistry. The opening chapters, concerned with the basic sciences as applied to anesthesia, are necessarily somewhat sketchy, but adequate references are given in the comprehensive bibliography.

The anatomic and physiologic aspects of respiration, circulation and the nervous system are outlined briefly, with minor discussions of the pharmacologic nature of the drugs acting on them. Nine pages are devoted to a brief discussion of the physical principles in anesthesia.

The portions of the book dealing with the anesthetic agents and technics are complete and well presented. The book is up to date even as regards such newly introduced drugs as Fluothane. This is fully discussed and adequately explained.

The material is presented in an orderly and logical fashion. Chapters are included with the following titles: *Definition and Theories of Anesthesia; Methods of Administration and Modes of Action,* and *Phases, Stages and Signs of Anesthesia.* Others deal with the anesthetic agents, other drugs, preanesthetic and postanesthetic care and the management of complications.

A glossary of terms and an Appendix with tables of normal values are also included.

Dr. Monheim's book could well be employed as a text in teaching dental anesthesia, although it is not quite detailed enough for a text on medical anesthesiology.

The typographical errors are minimal, and the type face is large and readable.

MYRON J. LEVIN, M.D.

Chirurgie du Rachis (Surgery of the Spine). By Andre Sicard. Paris: Masson et Cie, 1959. Pu. 483, with 166 illustrations.

A summary of spinal surgical procedures is given at the beginning of the book. The emphasis is on the newer technics of vertebral approach, e.g., anterior fusion at different levels of the spine. The management of spinal trauma is covered in an excellent chapter. It follows the classic views of Böhler in the management of spinal fractures, and here again the author brings up the indications for modern spinal surgical procedures.

A detailed discussion of the treatment of back pain is presented, well-documented with special chapters on the disc syndrome and spondylolysthesis.

On the treatment of Pott's disease, Prof. Sicard stands between the new trend toward radical operation and the old conservative treatment of osseous tuberculosis.

Other chapters, like those on scoliosis, congenital deformities, osseous dystrophies, etc., are less comprehensive. As the title indicates, the emphasis of this book is more on surgical indications and technics than on the physiopathologic pictures of diseases of the spine.

The illustrations are adequate. More than 150 references are included. All those interested in spinal surgery will certainly benefit by reading this book.

ANTONI TRIAS, M.D.

Traumatismes Anciens: Rachis et Membre Inférieur (Long-Standing Traumatisms of the Spine and the Lower Extremity). By R. Merle d'Aubigné and J. O. Ramadier, with the assistance of 10 collaborators. Paris: Masson et Cie, 1959. Pp. 546, with 218 illustrations.

This volume deals with late sequelae of trauma of the spine and lower extremity and is one of a series on orthopedic and reconstructive surgery. It is based on the authors' wide experience, acquired at the Clinique de l'Hôpital Cochin during the past ten years. The authors refer the reader to their work *Généralités* for pathologic considerations and generalized technic and to *Chirurgie Orthopédique des Paralysies* for management of the paralytic sequelae of trauma. They point out that the most frequent causes of permanent invalidism and incapacity are lesions of the bones, spinal articulations, lower extremity and hands. A critical analysis of original treatment is made with the object of minimizing the causes of failure and thereby reducing the number of incapacitated invalids.

The first part is devoted to diagnosis and treatment of fractures and dislocations of the cervical, dorsal and lumbar portions of the spine. Fractures are demonstrated by excellent roentgenograms; orthopedic and surgical treatment are well outlined, and the great need for reeducation is emphasized.

The second part considers the lower extremity according to topographic anatomy, beginning at the hip and terminating with the toes. The authors realize the importance of proper treatment of old traumatic lesions of the hip, which has justified a thorough study of the various types: fracture of the pelvis and hip, pseudarthrosis of the neck of the femur and necrosis of the femoral head. The chapters on pseudarthrosis—deformities resulting from malalignment of fractures of the femur—are based on the cases of 130 patients who underwent operation. Various operations well described are the correction of necrosis of the femoral head including such correction after the introduction of nails, etc.; arthoplasty of the hip with a prosthesis for pseudarthrosis of the femoral neck of the femur; intertrochanteric osteotomy for deformities due to malalignment, etc. There are many drawings and roentgenograms. Etiologic and anatomopathologic considerations precede the description of treatment, which consists of the use of a plaster cast and open intervention.

Much space (167 pages) is devoted to traumatic lesions involving the meniscus and ligaments of the knee, as well as to postoperative inflexibility. There are roentgenograms of bony structures, schematic diagrams and illustrations of various operations and photographs of patients with pathologic lesions of the knee before and after the reconstructive operation.

The difficult problem of indications for the treatment of deformities resulting from malaligned fractures and pseudarthrosis of the extremities, the tibia and the fibula are presented in a most thoroughgoing manner.

The etiologic factors, the anatomopathologic picture, the clinical course and the treatment of Volkmann's syndrome are described. The results following oblique section of the achilles tendon and resection of the posterior tibial nerve followed by autograft repair are noted. Long-standing fractures of the tibia and deformities resulting from malaligned fractures of the ankles are considered. Treatment of lesions of the tendons and ligaments, which include ligamentous tibiotarsal instability and rupture of the achilles tendion, are described.

A special chapter is devoted to the management of sequelae of fractures of the astragalus and calcaneus and of those following astragalectomy. The results of surgical treatment of tibiotarsal arthrodosis are described and are illustrated by roentgenograms taken before and after operation.

In the authors' opinion, proper treatment of traumatic osteitis of the femur, tibia and calcaneus is of the greatest importance. Infection at the site of fracture necessitates treatment over a long period and repeated surgical intervention, with the prognosis of a mediocre functional result and, in some instances, loss of the limb. Improved technics developed during the past twenty years, the judicious use of plaster cast and antibiotics and the excision of infected bone followed by replacement with living tissue (bone and skin grafts, etc.) have improved the authors' results.

The last chapter is devoted to the all-important technical principles of reeducation after treatment of old trauma of the lower extremity. Exercises for readaptation, coordination, diminished muscular power, control of edema and pain, employment of traction, etc., are described in detail.

This volume contains valuable information on treatment of long-existent lesions of the spine and lower extremity. Complications arising from inadequate original treatment of fractures and dislocations are cited. Operations on the spine, hip, thigh, knee, leg and foot are particularly well illustrated; the roentgen reproductions are clear; the photographs of patients before and after operation are instructive, and the methods employed for reeducation are highly informative. There is a complete bibliography. This is an excellent book and well worth reading.

CHARLES PIERRE MATHÉ, M.D.

Heritable Disorders of Connective Tissue. By Victor A. McKusick, M.D. St. Louis: The C. V. Mosby Company, 1960. 2d ed. Pp. 333, with 103 illustrations.

This book is directed to the general practitioner and internist. As the author points out in the preface, however, a number of specialists will certainly be interested in the subject; orthopedic surgeons, cardiovascular surgeons, pediatricians, dermatologists and ophthalmologists, to name but a few.

The first chapter is devoted to an excellent discussion on the clinical behavior of hereditary syndromes. The author has taken separate entities and grouped them in one category; all have in common a similar hereditary behavior and a basic defect in the enzymatic machinery of connective tissue. The biologic nature of normal connective tissue is discussed under the headings of cellular, fibrous and ground substance components. The chapter is concise and clear; the discussion is supported by a selected bibliography, which has been brought up to date from the first edition.

Following the introduction are the five outstanding chapters on Marfan's syndrome, the Ehlers-Danlos syndrome, osteogenesis imperfecta, pseudoxanthoma elasticum and the Hurler syndrome. Each chapter is a complete monograph in itself, and bibliography is up to date. In his comments the author not only relates what has already been published but introduces personal cases and personal opinions of great value. In the last chapter he attempts to link other disorders, such as fibrodysplasia ossificans progressiva and Padget's disease of bone, to dysfunction of connective tissue.

The book is an invaluable contribution to an improved understanding of the so-called idiopathic diseases of connective tissue. It is a stimulating work, raising many questions that need further investigation.

The second edition is more than one hundred pages longer than the first; the number of illustrations has been increased, and each chapter has been revised. The bibliographies have been substantially enlarged. The editor should be commended for the excellent presentation of the book.

ANTONI R. TRIAS, M.D.

Surgical Pathology. By Lauren V. Ackerman in collaboration with Harvey R. Butcher Jr. St. Louis: The C. V. Mosby Company, 1959. 2d ed., Pp. 1096, with 1,114 illustrations.

The second edition of Ackerman's *Surgical Pathology* is welcomed with open arms by all members of the medical profession who have studied the first edition and enjoyed it.

Certain chapters have been rewritten, others have been altered and in general, if that was possible, the book has been improved. The selection of reproductions and the technical

perfection of the photographs and photomicrographs is outstanding.

Although one may not always agree absolutely with the author's opinion, this reviewer considers the volume an absolute necessity in the library of every pathologist and one to be highly recommended to every surgeon.

WERNER F. EISENSTAEDT, M.D.

Henry E. Sigerist on the Sociology of Medicine. Edited by Milton I. Roemer, Research, Sloan Institute of Hospital Administration, Cornell University. With a foreword by James M. Mackintosh. New York: MD Publications, Inc., 1960. Pp. 397.

During his life Henry E. Sigerist was among the greatest of medical historians. He was learned in several languages and had, in addition, knowledge of three others. He was interested, throughout his studies in medical history, in the relation of the medical profession to the community and to the nation. From 1930 on he was considered an ardent advocate of socialized medicine, and he was thought to be closely associated with the Russian point of view. Indeed, he personally guided several groups of physicians who made trips to Russia under the auspices of Intourist.

The present volume contains 31 essays written by Sigerist from 1931 to 1955. Twenty-eight have been published before, two are from manuscripts found among his papers, and one is derived from an unpublished document he submitted to the World Health Organization.

The philosophy of Dr. Sigerist on medical care is expressed in a single sentence on page 45 of this book: "If medical care is to be available to all, it must be free of charge, like education." He therefore favored a completely salaried medical profession, the amount of the salary to be determined by experience and responsibility. He then concluded (on the same page) that such a system of medicine is not Utopian, since it is in operation in the Soviet Union.

Dr. Sigerist was a socialist. He wrote books on Soviet medicine, and he considered the Soviet medical system the pattern of all health services for the future. He was the first editor of the *American Review of Soviet Medicine*. He was an ardent advocate of the Wagner-Murray-Dingell bill and made many addresses in its support before both public and medical audiences. In one of his addresses he asked the medical profession to select Drs. Hugh Cabot and John Peters as their leaders.

One wonders how a historian with the tremendous background of knowledge that Sigerist possessed could have been so blind to trends in the United States. Conceivably the time may come again when the views held by the little groups of serious thinkers who supported socialization of medicine in this country will again become a prominent issue, but the developments that have occurred since the first health conference in 1938 indicate that that time is not now.

MORRIS FISHBEIN, M.D.

Fundamental Techniques of Plastic Surgery and Their Surgical Applications. By Ian A. McGregor, with a foreword by C. F. W. Illingworth. Edinburgh and London: E. and S. Livingston, Ltd., and Baltimore: The Williams and Wilkins Company (exclusive U.S. Agents), 1960.

This is a basic and practical manual for all surgeons, regardless of their special interests. It is concisely written and profusely illustrated and, as the title implies, deals with the fundamentals of plastic surgery.

The book is divided into two sections. The first part describes the basic technics involved in plastic repair of the skin. This section occupies almost two-thirds of the volume and is invaluable to the surgeon with little formal training in plastic surgery. The second part is rather sketchy but does illustrate some applications of basic technics.

The author discusses in great detail the care of wounds, methods of suturing to minimize scarring and the use of the Z plasty. The sections on free skin grafts, skin flaps and pedicle flaps are particularly well presented.

OSCAR J. BECKER, M.D.

Cosmetic Surgery: Principles and Practice. By Samuel Fomon. Philadelphia: The J. B. Lippincott Company, 1960. Pp. 651, with 608 illustrations.

The author has drawn liberally from his

twenty-five years of surgical experience, his lectures in postgraduate courses and his articles in various journals to compile a one-volume textbook on cosmetic surgery. The book is organized in two major portions. The first, *General Principles*, covers general preoperative and postoperative considerations, anesthesia, incisions and closure, wounds, scars and tissue transplantation. The second, *Regional Cosmetic Surgery*, considers cosmetic operations on the nose, skin operations, cosmetic ear operations, cosmetic eye operations, cosmetic maxillofacial procedures and cosmetic operations on the thorax, the abdomen and the extremities.

The first section should have great value for general surgeons and general practitioners, since the immediate care of the injured is so frequently in their hands. The plastic surgeon will find in the second section precise, detailed explanations of the latest and most widely accepted procedures in the entire range of cosmetic surgery. The author has arbitrarily stressed the discussion of operations designed to alter contour, solely for the purpose of improving the appearance; operations in which the primary objective is restoration of function, however, are also presented in order to bring the cosmetic component of these procedures into sharper focus. This approach to the subject is commendable, since there exists today no unanimity as to the dividing line between cosmetic and reconstructive surgery. Considerable space is alloted to the presentation of operations on the external nose and the facial skin. Noticeably absent, however, is a section of labial clefts.

The author presents the surgical technics in a step by step fashion, satisfactorily supplementing the concise descriptive text with detailed diagrams, line drawings and photographs. Together with the pertinent surgical anatomic data and the physiologic and pathologic correlations, the author includes in each discussion the pitfalls to be avoided and the specific problems that may be encountered.

This book is an invaluable addition to the library of the specialist in cosmetic surgery, the general surgeon and the general practitioner.

NEAL OWENS, M.D.

The Intestinal Tract: Structure, Function and Pathology in Terms of the Basic Sciences. By Richard Paul Spencer. Springfield, Ill.: Charles C Thomas, Publisher, 1960. Pp. 398.

The content of the book is well stated in the title. The author, in the preface, indicates that the book is not primarily about "bedside gastroenterology" but is a presentation of data necessary for the interpretation of intestinal function and dysfunction. The book succeeds very well in accomplishing this purpose. It will prove to be of much greater clinical value than is suggested by the introduction.

The first section deals with the development, genetics and structure of the intestinal tract, together with the clinical and laboratory technics commonly employed.

The second section discusses, in great detail, intestinal function and its modifiers in great detail. This includes the anatomy of the intestine, its physiology and biochemistry, with special chapters on enzymes and the gastrointestinal hormones. Absorption and malabsorption are discussed in a very satisfactory manner.

The third section in the book has to do with disorders of intestinal function, beginning with the effects of diet and psyche. Other chapters deal with ulcerative colitis, regional enteritis and pseudomembranous enterocolitis, potassium metabolism, isotonicity and the hemachromatosis and Wilson's Disease. There is an excellent chapter on the effects of irradiation on the digestive tract. The discussions of the pigmentary disorders and the carcinoid syndrome are competent.

The material is well presented, concise and highly informative. The references, placed at the end of each chapter, are well chosen and most helpful numbering in all approximately 1800 references. These do indeed provide ready access to the pertinent literature on intestinal function and dysfunction. The format is excellent. All in all, the book is to be highly recommended. It will be most useful to medical students and to practitioners who are interested in the basic problems of the physiologic and biochemical problem connected with the intestinal tract. The book does not

attempt to present exhaustive discussions of the various subjects included, but it does furnish an excellent starting point.

WALTER L. PALMER, M.D.

Surgery of the Foot. By Henri L. DuVries, with an introduction by Edward L. Compere. St. Louis: The C. V. Mosby Company, 1959. Pp. 494, with 403 illustrations.

The measure of success of a book is whether it accomplishes what the author set out to do. According to the author's statement of intention in his preface, *Surgery of the Foot* is successful: "Extreme disabilities of the foot, such as the talipes deformities, have received studious attention in published reports. They have on that account been given only a cursory nod of recognition here. This book is directed toward the commoner disabilities, which have been sparsely considered in medical writing and which have been widely neglected in teaching and practice."

Surgery of the Foot is a reference book, concisely written, and organized from a didactic point of view. As such, it is helpfully indexed and carefully documented, with a bibliographic list at the end of each chapter. The illustrations are satisfactory.

Although the title would indicate strictly surgical coverage, such nonsurgical problems as infections of the feet, burns and freezing, ulcers, the "early diabetic foot," diseases of the skin and toenails, bursitis and some diseases of the nerves are also included. The most significant surgical chapter is the one on static deformities (with the deliberate exception of talipes), especially those due to bunions. The author discusses prevalent surgical technics and outlines the procedures step by step. In almost every instance he states his preference or recommendation often an original modification.

Notwithstanding the general simplicity of subject matter, the book can be advantageously utilized by the orthopedic specialist who, through overspecialization, may have neglected many minor but none the less disabling disorders of the foot.

DONALD S. MILLER, M.D., Ph.D.

Dental-Medical Emergencies and Complications. By Ira J. Berlove. Chicago: The Year Book Publishers, 1959. Pp. 380.

Most emergencies in dental practice arise in connection with oral surgical procedures. Some of them are extremely painful to the patient, and all of them are annoying to the surgeon.

Dr. Berlove has supplied the profession, in this comprehensive work, with a veritable postgraduate course of remarkable value to both the dentist and the medical or surgical practitioner. A number of case histories are included and make the book both interesting and stimulating. An important feature is a detailed list of the drugs and instruments indicated in the treatment of a variety of possible complications, which alone will probably prove invaluable to the book's possessor. In the opinion of this reviewer, Dental-Medical Emergencies and Complications is a decidedly worth-while contribution to the professional library, either private or institutional.

EDWARD B. DEKOVEN, M.D.

I become more and more convinced that a sensible man is to be known by his humility. Conceit is incompatible with understanding.

—*Panin*

Abstracts from Current Literature

Elective Splenectomy: An Analysis of 220 Operations. Sedgwick, C. E., and Hume, A. H., Ann. Surg. 151:163, 1960.

A comprehensive review of the indications for splenectomy, with the authors' experiences in 220 elective cases and the surgical results, is presented. The procedure was indicated in the following instances: (1) hepatic disease with and without portal hypertension; (2) idiopathic thrombocytopenic purpura; (3) congenital and acquired hemalytic anemia; (4) enlargement of the spleen, either neoplastic or non-neoplastic; (5) cysts of the spleen, and (6) primary splenic dyscrasias. All indications for the surgical procedure were supported by medical and hematologic investigation.

Some of the indications for splenectomy are considered controversial for the entity described. The cases assembled from the period 1939 to 1957, and a 7 per cent mortality rate was reported, which is considered satisfactory for the class of disease treated.

ROBERT G. MCCORKLE, M.D.

Multiple Primary Cancer, A Clinical-Statistical Investigation Based on 650 Cases. Malmio, K., Ann. Chir. et Gynaec. Fenniae 48: Sup. 92, 1959.

From the opening, in 1936, of the Central University Hospital Department of Radiotherapy, Helsinki, until Dec. 31, 1956, 27,712 patients with a total of 28,756 carcinomas or other malignant tumors were entered in the files of the Department. In 650 of these patients multiple primary carcinomas were detected as follows: double in 635, triple in 14 and quadruple in 1. The incidence of multiple carcinoma was thus 2.34 per cent.

The diagnosis of multiple malignant tumor in each case was based on careful consideration, particular attention being paid to elimination of the possibility of metastasis.

In 320 (49.2 per cent) of the cases of multiple tumor the growths were located in the same organ or system: in the skin in 248, in the mouth and pharynx in 17, in these organs and in some other gastrointestinal site in 16. In 1 case the carcinomas were situated in the bladder and kidneys, in 6 in the female genital tract and in another 6 in the larynx and lung. Bilateral carcinoma of the breast was present in 26 cases. Of 330 patients (50.8 per cent) with tumors located in different systems, 214 had carcinoma of the skin in conjunction with carcinoma of some other organ. In these cases the distribution of the other tumors over different organs was as follows: gastrointestinal tract, 92; breast, 32; female genital tract, 28; respiratory tract, 30; urinary and male genital tracts, 14, and other sites, 18. In 28 cases the gastrointestinal was one tumor site and the respiratory tract another. In 22 cases it bore the same relation to the breast; in 6 to the female genital tract; in 4 to the urinary and male genital tract, and in 12, some other site.

The multiple tumors were synchronous in 179 patients with double carcinoma and in 1 with triple carcinoma; metachronous in 456 patients with double carcinoma, in 13 with triple carcinoma and in the only patient in the series with quadruple carcinoma.

As an outcome of this investigation, the following conclusions were drawn:

Location: Multiple carcinoma occurs most frequently in the same organs that are the commonest sites of single carcinoma. The sites of the later-appearing tumors in the multiple category are the skin, the stomach, the large intestine, the prostate, the oral cavity, the salivary glands and the bladder, in that order. In cases of double carcinoma the organs most frequently combined are the skin and lip and the gastrointestinal tract, or either of these together with some other site. In cases of triple and quadruple carcinoma the order of frequency corresponds to that observed in cases of double carcinoma.

Incidence: The incidence of multiple malignant disease corresponds to the figures generally reported in the literature. Relatively speaking, patients with carcinoma of the skin

or lip have multiple tumors most often, and the incidence is lower in patients with carcinomas that generally have a poorer prognosis.

Length of Interval: The mean length of the interval in cases of double carcinoma was four and eight-tenths years.

Age and Sex Distribution: Multiple carcinoma is commoner in women than in men, the ratio being 1.71:1.

Duration of Symptoms: The duration of symptoms caused by the second carcinoma is clearly shorter, in cases where the patient is able to see or feel the tumor with his fingers, than the duration of symptoms due to the first tumor. The mean values are one and two-tenths and two and one-tenth years, respectively.

Causation: The factors which possibly influence the development of multiple carcinoma do not differ fundamentally from those generally regarded as responsible for carcinoma in general.

Susceptibility to Carcinoma: The data obtained by routine questions as to the occurrence of carcinoma in the patients' families do not justify the assumption that a hereditary factor exists. Of the patients with multiple tumors, 20.6 per cent had a history of carcinoma in the family, as did 11.3 per cent of those with multiple carcinomas of the skin. Nor do the results in the Malmio series indicate that patients with single carcinomas are any more liable to further malignant change than is any member of the general population to malignant change in the first place. In carcinoma patients aged 20 to 49 years, however, the danger that a new tumor will develop is somewhat greater than the morbidity rate for the same age groups in the whole population.

Treatment and Duration of Illness: The treatment of multiple carcinoma does not differ essentially from the treatment of the single type.

Results: When the results of treatment are calculated as five-year and ten-year survival in the different age groups, the mean values in the multiple series are 72.5 and 51.9 per cent, respectively.

No definite conclusions can be drawn from this investigation, or from any similar clinical series, as to whether patients with carcinoma have a specific predisposition toward secondary neoplastic development.

JOHN A. ZIEMAN, M.D.

Discography: Technique and Interpretation. Keck, C., Capt., Arch. Surg. 80:580, 1960.

The author outlines a roentgenographic technic for visualization of the intervertebral disc, with injection of a radiopaque substance into the intervertebral space. This technic is not new; on the other hand, it is not a common diagnostic procedure. In the author's opinion it is valuable because it affords accurate evidence of pathologic conditions involving the intervetebral disc. His description of his technic is clear and concise and is well illustrated.

Interpretation of the discographic data is dependent upon five factors: (1) the amount of dye acepted by the intervetebral space; (2) the degree of pressure necessary to inject the material; (3) reproduction of the patient's pain on injection; (4) the roentgen pattern of dispersal of the dye, and (5) correlation with the clinical picture. Additional schematic drawings in this article illustrate abnormalities noted on the roentgenogram after injection of the dye.

The author discusses possible use of hydrocortone injection at the time the discograms are taken and suggests that the clinical response of the patient thereto may have some diagnostic significance.

Discographic study is one more diagnostic procedure to be used in establishing the diagnosis of discal disease; it is not absolute in and of itself, since "false positive" results occasionally are obtained, but when it is used in conjunction with other routine studies it can be a considerable help.

CHARLES M. SWINDLER, M.D.

Axillary Lymph-Nodes in Patients Without Breast Carcinoma. McNair, T. J., Dudley, H. A. F., Lancet 1:713, 1960.

Examination of the axillary lymph nodes is an important part of the investigation of patients with carcinoma of the breast.

This study of the incidence of palpable axillary lymph nodes in the normal female is

described. Palpable nodes were found in 37 per cent of female axillae, without evident causative disease.

Concerning 35 to 40 per cent of patients, differences of opinion arose between examiners.

The bearing of these data on the clinical staging of carcinoma of the breast is discussed, and it is concluded that the use of axillary lymph nodes for this purpose is valueless and misleading.

EDMUND LISSACK, M.D.

The Double Portacaval Shunt in the Treatment of Cirrhotic Ascites. McDermott, W. V., Surg., Gynec. & Obst. **110**:457, 1960.

An interesting review of current knowledge of cirrhotic ascites is presented. Once again the indications for portacaval shunt, such as bleeding esophageal varices and medically intractable ascites, are documented.

The double portacaval shunt is considered an improvement over the presently preferred side-to-side shunt, as it is said to provide greater decompression of both splanchnic and hepatic vascular beds. The operation entails division of the portal vein and end-to-end anastomosis of both its ends to the vena cava. The author's experience with the method is discussed.

CHURCH E. MURDOCK JR., M.D.

Oophorectomy and Adrenalectomy in Patients with Inoperable or Recurrent Cancer of the Breast. Randall, H. T., Am. J. Surg. **99**:553, 1960.

After presenting concisely the development of attempts to modify the course of mammary carcinoma by therapeutic oophorectomy, the author presents evidence from Memorial Center indicating per cent of objective remissions averaging more than fourteen months in duration in premenopausal women with inoperable or recurrent carcinoma of the breast. Evidence is presented which appears to justify prophylactic oophorectomy for normally menstruating and premenopausal women, at least for those in whom axillary metastases occur shortly after radical mastectomy. Orchiectomy for carcinoma of the male breast is useful in palliation.

An analysis of 155 semiselected patients, 73 of whom underwent adrenalectomy and 82 adrenalectomy plus oophorectomy, is presented, showing a 40 per cent average objective remission of one year with an 8 per cent operative risk. Highlights of operative technic and of preoperative and postoperative medication are covered. The author then presents plans of management of patients with recurrent or primary inoperable carcinoma of the breast in three endocrine categories: normal menstrual or premenopausal, menopausal to ten years postmenopausal and late postmenopausal.

The article is a very competent appraisal, incorporating a carefully analyzed series from a leading center, of management of the endocrine status of women with inoperable carcinoma of the breast.

E. FORREST BOYD JR., M.D.

Hypophysectomy in the Treatment of Metastatic Mammary Cancer. Pearson, O. H., and Ray, B. S., Am. J. Surg. **99**:544, 1960.

This is a rather thoroughgoing evaluation of surgical hypophysectomy as performed on 343 patients with advancing metastatic mammary carcinoma over the five-year period ending in 1959. The only criterion for acceptance was the opinion that the patient could survive the surgical procedure. The operative technic and hormonal replacement therapy are briefly outlined. Only objective evidence of improvement was considered. The overall mortality rate was 6.6 per cent, with a commendable 1.2 per cent operative mortality rate. Postoperative complications were studied, defects of the visual fields being predominant.

Consideration of the results showed a high correlation between the response to oophorectomy in the premenopausal woman and the subsequent response to hypophysectomy. In the authors' opinion, either hypophysectomy or adrenalectomy should be performed when appropriate; the former is preferred. Autopsies have been performed on about half the patients, and serial sections of the sella turcica in 35 instances showed *complete* removal of pituitary tissue in only two-thirds.

It would seem, therefore, that surgical hypophysectomy is a practical, worth-while therapeutic procedure and can be recommended as

the initial systemic treatment of choice for postmenopausal patients and those whose response to previous oophorectomy is favorable.

E. FORREST BOYD JR., M.D.

Effects of Cancer Chemotherapeutic Agents on the Human Fetus. Sokal, J. E., and Lessman, E. M., J.A.M.A. 172:1765, 1960.

Pregnancy is uncommon in women with carcinoma. When it does occur it need not, in many cases, affect greatly the treatment of the neoplasm, although it may change the prognosis.

The effects on the human fetus of chemotherapeutic agents used in the treatment of carcinoma are reviewed in this study, and follow-up information is assembled on children born to women treated with various cytotoxic agents during pregnancy.

Busulfan and 6-mercaptopurine, administered in alternating courses throughout pregnancy, produced multiple severe fetal abnormalities, although neither drug caused major fetal damage.

EDMUND LISSACK, M.D.

Ischemia of the Colon as a Complication in the Surgery of the Abdominal Aorta. Smith, R. F., and Szilagyi, D. E., Arch. Surg. 80:114/806, 1960.

From a series of 120 aneurysmectomies of the abdominal aorta, presumably from the Department of Surgery of the Henry Ford Hospital, 12 cases of ischemic complications referable to the colon are here reported. The complications varied from transient mucosal ulceration to massive gangrene of the left half of the colon. A study was made of the vascular relations, the methods of prevention and the management of these complications.

In any surgical procedure involving the abdominal portion of the aorta, where the inferior mesenteric artery on the one hand, and both iliac arteries on the other, are involved, it is imperative that at least one internal iliac artery be preserved to insure an adequate blood supply to the rectosigmoid colon, even if salvage seems impossible at the time. When the obliterative or obstructive process is slow, there may be ample collateral circulation to eliminate the problem, unless vascular anomalies contrive against it.

In all of the 12 cases ischemia was limited to the rectosigmoid. In 90 per cent no grossly detectable ischemia was observed when the inferior mesenteric and both iliac arteries were temporarily occluded during aneurysmectomy. The degree of the effects of ischemia was not entirely proportional to the duration of occlusion. More important factors seemed to be the degree of atherosclerotic involvement and the character of the secondary bacterial invasion of the damaged bowel wall. No antibiotics were given before the onset of symptoms. It was remarkable that atherosclerotic embolization was a rare cause of ischemia, occurring in only 1 case.

EDWIN R. CORE, M.D.

The Normal Mechanism of Uterine Support and Its Clinical Implications. Ulfelder, H., Western J. Surg., Obst. & Gynec. 68:81, 1960.

This study approaches the problem of cystocele and uterine prolapse on the basis of comparative anatomy, quadruped and the human. Since 1900, two mechanisms have been stressed: (1) the ligamentous attachments of the cervix and the upper part of the vagina and (2) the combination of levator muscles and the pelvic diaphragm. The former pull the cervix upward and backward toward the concavity of the sacrum, while the latter displace the vaginal oriface forward.

A review of the axes and course of the birth canal demonstrates the dynamics involved in the support of the normal uterus and the mechanism of herniation in the multiparous. In the latter the cervix and vaginal apex are displaced forward and downward, or the vaginal orifice is so much enlarged that the posterior border of the introitus is behind the cervix. Vaginal hysterectomy, the Manchester-Fothergill procedure and the Spaulding-Richardson composite operation all correct these features to a degree. Correcting the obliquity of the birth canal remains a problem.

The ideal operation should strive to restore the normal axis and proper caliber of the vaginal orifice as well as the normal obliquity of the birth canal, resulting in a vaginal apex that remains in position when the patient stands.

To diminish the vaginal orifice and recreate the normal obliquity would not be surgically practical. It would require reconstructing the urogenital diaphragm and narrowing the gap between the levator muscles. The most satisfactory method is still the deep perineal dissection and repair, with approximation of the levator muscles between the vagina and the rectum establishing a firm perineal body.

EDWIN R. CORE, M.D.

Potential Treatment of Cancer by Electromagnetic Heating. Gilchrist, R. K., Surg. Gynec. & Obst. 110:499, 1960.

There is a good probability that carcinoma, even if not due to a virus may succumb to elevated temperatures. It has been shown generally that most plants and animals can withstand relatively low temperatures for a much longer period than they can tolerate a comparable rise. Undoubtedly this is different for various tissues and cells. A recent report indicates that it is possible to cause local necrosis in tissue by placing an animal in an electromagnetic field with small magnetic particles in the tissue. Preliminary studies also indicate that various viscera, such as the liver, kidney, stomach and colon, heat at different rates when so treated even if no target material is present.

This would mean that it is possible to raise the temperature in specific internal organs which might be the sites of tumor, in the hope of obtaining a differential reaction between normal and tumor cells. This might be further enhanced by the systemic use of other agents, such as hormones, enzymes, and/or target material in the electromagnetic field. The potential value of this approach to carcinoma therapy warrants intensive investigation.

JULIAN S. LEWIS, M.D.

Relation Between Spondylosis Cervicalis and Injury of the Cervical Spine and Its Contents. Munro, D., New England J. Med. 262:839, 1960.

Spondylosis cervicalis has been known to the medical profession for years under the name "cervical hypertrophic arthritis" or "cervical hypertrophic osteoarthritis." Monro discusses this condition in the light of its possible relation to trauma. He reviews the records of 359 patients with injuries to the cervical portion of the spinal cord observed and treated by himself over the past thirty years at the Boston City Hospital. Of the 359 patients, 116 presented the concurrent problem of spondylosis. Monro's first major conclusion after analyzing his case studies was that the presence of spondylosis has no immediate or remote etiologic relation to the symptoms of an accidental cervical cord injury. He contends that a herniated soft tissue disc is a separate entity from spondylosis, though these processes may coexist, and that, furthermore, the presence of the chronic condition does not prevent the acute one from developing in addition. The diagnostic problems presented by spondylosis cervicalis are a challenge, especially if there is concomitant acute trauma. It is highly essential that a differential diagnosis be established, because spondylosis cervicalis, particularly in the aged, can be lethal.

Monro outlines the diagnostic studies he considers important and the therapy he has found most effective. His therapy falls into two classifications: operative therapy, both emergency and nonemergency, and the conservative (nonoperative) therapy. The operative therapy is primarily designed to decompress a compressed cord. The author stresses the fact that an operation designed to correct preexisting spondylosis cervicalis leaves much to be desired. The nonoperative therapy is based on skeletal traction.

In Monro's opinion, heavy skeletal traction is effective. It is significant that a serious injury to the cervical cord may follow trauma even in the absence of demonstrable osseous damage or dislocation, and the attending physician should keep this in mind when making his differential diagnosis. He should also bear in mind that cerebral spinal fluid dynamics and the total protein content of the spinal fluid may not be altered in the presence of spondylosis cervicalis.

Many physicians today are confronted with the problem of traumatic aggravation or acceleration of spondylosis cervicalis. The author discusses this question rather extensively. It is his opinion that chronic spondylosis cervicalis is neither aggravated nor initiated by an immediate, proximate accidental acute in-

jury, either to the cervical portion of the spine or to its contents.

CHARLES M. SWINDLER, M.D.

Severe Hemorrhage from Esophagogastric Varices: Its Emergency Management with Particular Reference to Portacaval Anastomosis. Rousselot, L. M., Gilbertson, F. E., and Panke, W. F., New England J. Med. 262: 269, 1960.

The data in this excellent academic review of cases and statistical results is comparable with data reported from other large clinics. The authors' experiences with esophageal compression due to varices are similar to those of others, though a slight improvement in results was noted with the method described. A Sengstaken-Blakemore tube was used for palliation in cases of critical recurrence. Various surgical shunts were used in early and elective cases of esophageal bleeding, either primary or recurrent. The mortality rate for each group reported is consistent with those recorded for other reported series.

Mortality and morbidity rates were related to the degree of hepatic disease and/or systemic disorders. New diagnostic methods in hepatic cirrhosis and occlusion of the portal system are outlined.

ROBERT G. MCCORKLE, M.D.

Surgical Correction of Male Sterility. O'Conor, V. J., Surg., Gynec. & Obst. 110:649, 1960.

This article describes a study of 157 patients who presented themselves for complete azoospermia and on whom surgical exploration or corrective operations were performed. The cases of some of these patients date back thirty-nine years, and those of others fall within the year just past. The various causes of mechanical obstruction or lack of continuity of the vasoepididymal ductal system are listed, and a brief historical review is given. The pathologic picture is also discussed. Surgical treatment was divided into four groups: (1) operations for uniting or anastomosing the vas and the epididymis; (2) operations for anastomosing the vas with individual epididymal tubules; (3) anastomosis of the vas deferens to a spermatocele, and (4) reunion of the cut ends of the vas for the purpose of reestablishing their luminal integrity.

As might have been expected, the results in the first three groups were rather poor. Actual fertility was restored in not more than 10 to 16 per cent of the patients operated upon. The best results were obtained in Group 4. Of 34 patients in reasonably satisfactory anatomic condition for vasal reunion, 20 had what appears to be a completely successful result; that is, the sperm count has repeatedly been over 20,000,000 per cubic cemtimeter and apparently normal morphologically and in motility. In the author's opinion, while the results obtained have produced both pessimistic and optimistic comment, continued and more widespread work along these lines seems warranted in the hope of restoring fertility to more patients.

CARL K. PEARLMAN, M.D.

Operative Correction of Retrocaval Ureter: A Report of Four Cases and Review of the Literature. Rowland, H. S. Jr., Bunts, R. C., and Iwano, J. H., J. Urol. 83:820, 1960.

The authors emphasize the fact that retrocaval ureter, also known as circumcaval ureter, or postcaval ureter, is a congenital anomaly, primarily of the vascular system. More than 90 cases have been reported in the literature, and the authors add 4 more cases. In 2 of these the condition was treated by plastic operative procedures. The embryologic aspects of this condition are reviewed. It was pointed out that involvement of the urinary tract in this vascular anomaly stems from the fact that the metanephros, as it arises from its pelvic to lumbar position, passes through a "ring" of embryonic venous channels. The anomaly almost always involves the right ureter and apparently occurs more frequently in the male. No definite symptom complex is noted, because the degree of obstruction of the ureter is apt to be variable. The average patient has a history of intermittent or constant pain in the flank, with hematuria in two-thirds of the cases, and vague gastrointestinal symptoms. Pyuria has frequently been noted in the presence of infection or stones. The diagnosis can be made only by roentgen ray, which shows the S-shaped course of the ureter. In the authors' series, nephrectomy was the procedure

of choice when the kidney was beyond salvage.

Various methods of plastic repair are discussed. A comprehensive review of surgical procedures for correction of retrocaval ureter is given in Table 1. It is pointed out, however, that stricture formation at the site of the reanastomosed ureter was common. The possibility of ligating or resecting the vena cava is also mentioned.

CARL K. PEARLMAN, M.D.

Transventricular Mitral Valvotomy. Crum, H. B., and Tsapogas, M. J. C., Lancet 2:880, 1959.

The authors analyze 50 consecutive personal cases of mitral commissurotomy performed by the transventricular route. A dilator was employed. Satisfaction with the method is expressed.

CHURCH E. MURDOCK JR., M.D.

A Comparative Analysis of Two Procedures for Chronic Duodenal Ulcer. Palumbo, L. T., Sharpe, W. S., Lulu, D. J., Vespa, R., and Colon-Benet, J., Arch. Surg. 80:85-253, 1960.

Antrectomy with bilateral infradiaphragmatic vagectomy for chronic duodenal ulcer is at present the authors' operation of choice. An analysis of the results of this procedure compared with those of other methods they have used in the past, particularly partial gastrectomy (75 per cent) with vagectomy shows them to be far better in every respect.

Antrectomy with vagectomy is the operation of choice because of (1) lower morbidity and mortality rates; (2) more rapid rehabilitation; (3) fewer side effects; (4) shortened operating time and hospital stay; (5) least chance, if any, for recurrent or marginal ulcer, and (6) overall results superior to those of partial gastrectomy with vagectomy or other operative procedures.

WILLIAM E. NORTH, M.D.

The Association of Periodic Paralysis with Hyperthyroidism. Law, S. W., Rochelle, J. B., and Jordan, G. L., Arch. Surg. 80:181, 1960.

An unusually interesting syndrome occasionally associated with hyperthyroidism is described and discussed. A complete detailed historical review of the problem is presented. Pitfalls in diagnosis and hints on the diagnosis and treatment are given in this interesting article.

R. G. MCCORKLE, M.D.

Thyroiditis and Cirrhosis of the Liver. McConkey, B., and Callaghan, P., Lancet 1:939, 1960.

Three cases of cirrhosis of the liver and thyroiditis in postmenopausal women are presented, with laboratory and postmortem observations. An association between these two diseases is suggested.

R. G. MCCORKLE, M.D.

The Role of Chemotherapy in the Treatment of Breast Cancer. Bateman, J. C., and Carlton, H., Surgery 47:895, 1960.

During the past ten years many compounds have been developed with a carcinolytic or carcinostatic potential. These include the polyfunctional alkylating agents, antimetabolites, certain antibiotics, steroid hormones and various other agents. The authors employed the polyfunctional alkylating agent called Thio-Tepa in the cases of 296 patients with carcinoma of the breast. Maintenance therapy with this agent resulted in objective remission of metastatic nodes, subcutaneous nodules, ulceration, etc. Survival rates were increased over those for comparable patients treated in other ways. In addition to the usual method of administration, prophylactic chemotherapy with Thio-Tepa at the time of operation was employed in 17 cases of presumably early mammary carcinoma. There has been no recurrence in 15 cases three to thirty-three months after treatment. One patient had a local recurrence after twenty-one months, and 1 died in five and a half months of massive hepatic metastases.

BERNARD J. FICARRA, M.D.

Radical Mastectomy with Conservative Anterior Mediastinal Node Dissection. Yonemoto, R. H., and Byron, R., Surgery 47:908, 1960.

This paper deals with one facet of the problem of mammary carcinoma, namely, the diagnosis and management of metastases to the internal mammary chain. As an added method

in surgical treatment of carcinoma of the breast, the authors describe a "trap door" approach. A trap door is formed and lifted up, fracturing the rib cartilages at their juncture with the body of the sternum. Thus, when the flap is hinged over, the internal mammary lymphatic chain surrounding the internal mammary vessels is seen on an exposed surface. The internal mammary vessels are ligated and divided just below the first rib and also at the superior border of the fifth rib. The perforating vessels as well as the anterior intercostal vessels are divided and ligated. The entire lymphovascular chain, embedded in adipose tissue, is resected in continuity and sent to the pathologist for permanent section. After excision of the chain the trap door is closed with single catgut or wire sutures through each of the cartilages. The procedure is performed extrapleurally, with care.

BERNARD J. FICARRA, M.D.

Portal Vein Obstruction—Cause of, or Cure for Portal Hypertension. Stephenson, W. H., Surg., Gynec. & Obst. **110:357**, 1960.

The author questions the strong preference for side-to-side portacaval anastomosis in cases of portal hypertension. In his opinion, current evidence should warrant the following:

1. In clinical cases of portal hypertension a lesion capable of producing clinical obstruction to the flow of portal blood is often not demonstrable, and if one is present it is seldom, if ever, established that it is more than coincidental or that it is not the result rather than the cause of portal hypertension.

2. Portal hypertension cannot be reproduced in its clinical form by obstructing the portal vein experimentally. A point the author raises is the role of intrahepatic arteriovenous shunting and the hepatic artery inflow in causing portal hypertension. If the statements are valid, he considers end-to-side anastomosis or simple ligation of the portal vein a better procedure. These topics are discussed briefly. Some of the literature on the subject is reviewed, and the author recommends that more attention be paid by investigators to the cause of portal hypertension before definitive treatment is started.

JOSEPH BERKE, M.D.

Advance does not necessarily mean progress to something new—it means progress to something better; and improvement very often awaits the application of principles that are so simple and familiar that we have become oblivious of their presence. We cannot even go from one theatre to another in the same hospital, without being aware of the great divergence in the methods used by different surgeons to treat the same disease. Which is right? Surgery is not complete till we can give the answer to this question, and we can only do so by applying the test of function. Our patients are not interested in pathology; they are not even concerned with form except in the limited field of cosmetic surgery. They come to us because of some disorder of function, and will judge our treatment by whether function is restored or improved as the result of it. Therefore, in planning the measures we shall take to relieve them, be they operative or otherwise, we must ask ourselves: 'How and why has function been deranged in this case; how can normal function be restored or, failing that, how best imitated; how do the operations we plan produce the effects they do, and how are those effects altered by various modifications: how much will they improve function, and for how long? We must turn to physiology, whose province is the study of function and of the interdependence of organs and systems, as something which is neither chemical, physical, nor anatomical, but transcending and uniting these characters.

—Ogilvie

IMPORTANT ANNOUNCEMENT

Contributors of scientific articles for publication in The Journal of the International College of Surgeons from Europe, the Near East and the Middle East should send their articles to:

European Office of the
International College of Surgeons
6-8 Rue de la Confederation
Geneva, Switzerland

A special committee has been appointed to evaluate the papers submitted for publication. The Journal publishes summaries in English, French, German, Spanish, Italian and Portuguese. Summaries of articles should be included in as many of these languages as possible.

AVIS IMPORTANT

Les auteurs d'articles scientifiques destinés à être publiés dans le Journal du Collège international de chirurgiens sont priés d'adresser leurs articles à l'adresse suivante pour l'Europe, le Proche et le Moyen Orient.

Bureau Européen du
Collège international de chirurgiens
6-8 rue de la Confédération
Genéve (Suisse)

Un comité a été nommé pour l'examen des articles à paraître. Les auteurs sont priés de joindre à leur travail de brefs résumés en français, anglais, allemand, espagnol, italien et portugais si possible.

COLLÈGE INTERNATIONAL DE CHIRURGIENS
GENÈVE 35

FOUNDED BY DR. MAX THOREK

Journal of the International College of Surgeons

EDITORIAL OFFICE: 1516 LAKE SHORE DRIVE, CHICAGO 10, ILLINOIS
CIRCULATION OFFICE: 10 COLUMBUS CIRCLE, NEW YORK 19, N. Y.
JOSEPH J. BORIS, BUSINESS AND CIRCULATION MANAGER

SURGEONS' AIDS

EDITED BY LEON A. FRANKEL, M.D., F.I.C.S., PHILADELPHIA, PA.

(A service created for surgeons, surgical manufacturers and members of the Allied Sciences.)

This section of the JOURNAL OF THE INTERNATIONAL COLLEGE OF SURGEONS is available to Surgeons (and members of the allied sciences), Surgical Manufacturers who wish to present their new developments to the medical profession at the earliest opportunity, and to those Physicians or Surgeons who seek a ready reference for the latest advances in SURGEONS' AIDS.

There is no obligation connected with this service. All that is asked is that you submit to the Journal your latest implements, by means of an electro or photograph presenting the item in question with a description and means of application of the particular instrument or device.

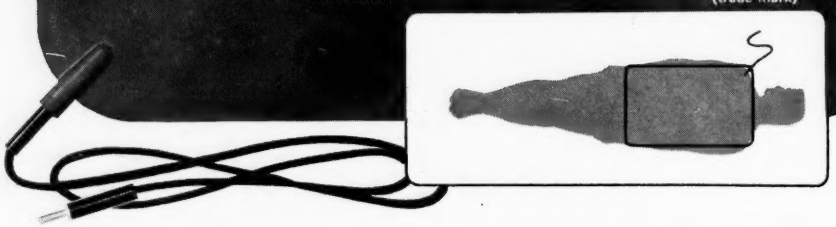
The article will be condensed to a maximum of approximately 150 words depending upon the size of the cut. A 120 screen half-tone of $1\frac{1}{4}$ x $1\frac{1}{2}$ or $1\frac{1}{2}$ x $2\frac{3}{4}$ inches to accompany the descriptive material is desired. A glossy photograph of the subject may be forwarded to the Journal as an alternative and an appropriate cut will be made. This would entail on your part only the actual cost of producing the cut. The idea of this service is to obviate the delay in presenting to the profession items of interest which, as you know, sometimes takes a year or more for publication. Introduction in the Journal however does not imply endorsement by the International College of Surgeons of the subject presented.

Leon A. Frankel M.D.

Correspondence, Photographs, Descriptive Material, Electros etc. should be directed to: Leon A. Frankel, M.D., F.I.C.S., c/o Journal, International College of Surgeons, Professional Service Dept., 10 Columbus Circle, New York 19, N.Y.

ELIMINATE INDIFFERENT PLATE BURNS IN ELECTROSURGERY!

THE NEW BIRTCHER SAFETRODE (trade mark)



Now . . . make burns by indifferent electrode during electrosurgery an impossibility. The Birtcher Safetrode is a large, flat condenser (25½" x 15½", molded in autoclavable neoprene) that matches the capacity of the patient's body and induces energy into the patient. It completely eliminates the antiquated metal indifferent plate which nurse and doctor must continually check for proper fit and contact—no need for messy jellies either. Simply place the Birtcher Safetrode on the operating table in a position approximating the trunk of the body with the usual sterile sheet draped over it, or leave permanently under operating table pad. Safetrode does not depend on skin contact for proper functioning. Patient may be moved at will, in any position, with no reason for concern. Thoroughly tested and enthusiastically approved by surgical staffs of leading hospitals. Fits every make and model of electrosurgery machine. Specify make and model when ordering so proper cord tips can be fitted. Order a Birtcher Safetrode for every electrosurgical unit right now. **Stop burns . . . stop lawsuits!**

IF YOUR DEALER CANNOT SUPPLY YOU, USE THIS COUPON

The new Birtcher Safetrode offers new safety for patient, doctor and hospital. You may anticipate 25 years of trouble-free use. Guaranteed to please or your money back. Fill out and mail today!

THE BIRTCHER CORPORATION

Department ICS-960
4371 Valley Blvd.
Los Angeles 32, California

☐ Send me _____ Safetrode (s) at $78.00 each
(Specify make and model of electrosurgery machine.)

☐ Have a Birtcher Representative demonstrate the Safetrode.

Name _____

Hospital _____

Address _____

City _____ Zone _____ State _____

COLLEGE INTERNATIONAL DE CHIRURGIENS
GENEVE 1935

FOUNDED BY DR. MAX THOREK

The Journal of the International College of Surgeons

Official monthly publication of the International College of Surgeons

Edited by Philip Thorek, M.D., F.A.C.S., F.I.C.S.

EDITORIAL BOARD

Lyon H. Appleby, M.D., C.M., L.R.C.P., F.R.C.S. (Eng.), F.R.C.S. (Can.), F.A.C.S., F.I.C.S.
Vancouver, B. C., Canada

Harry E. Bacon, M.D., F.A.C.S., F.I.C.S., F.R.S.M.
Philadelphia, Pennsylvania

Hamilton Bailey, M.D., F.R.C.S., F.I.C.S. (Hon.)
London, England

Raffaele Bastianelli, M.D., F.I.C.S. (Hon.)
Rome, Italy

Ruston N. Cooper, M.S., F.R.C.S. (Eng.), F.R.C.P. (Eng.), F.I.C.S.
Bombay, India

Paul C. Craig, M.D., F.A.C.S., F.I.C.S.
Reading, Pennsylvania

Raymond Darget, M.D., F.I.C.S.
Bordeaux, France

A. Mario Dogliotti, M.D., F.I.C.S. (Hon.)
Torino, Italy

Gordon Heyd, M.D., F.A.C.S., F.I.C.S. (Hon.)
New York

Claude J. Hunt, M.D., F.A.C.S., F.I.C.S.
Kansas City, Missouri

Oscar Ivanissevich, M.D., F.I.C.S. (Hon.)
Buenos Aires, Argentina

Arnold Jackson, M.D., F.A.C.S., F.I.C.S.
Madison, Wisconsin

Albert Jentzer, M.D., F.I.C.S.
Geneva, Switzerland

William Carpenter MacCarty, Sr., M.D., F.A.C.P., F.I.C.S. (Hon.)
Rochester, Minnesota

Manuel A. Manzanilla, M.D., F.I.C.S. (Hon.)
Mexico City, Mexico

Charles Pierre Mathé, F.A.C.S., F.I.C.S.
San Francisco, California

Vasant P. Mehta, M.D., M.S., F.C.P.S., F.I.C.S.
Bombay, India

Henry W. Meyerding, M.D., F.A.C.S., F.I.C.S.
Rochester, Minnesota

Rudolph Nissen, M.D., F.I.C.S. (Hon.)
Basel, Switzerland

Curtice Rosser, M.D., F.A.C.S., F.I.C.S.
Dallas, Texas

Robert L. Sanders, M.D., F.A.C.S., F.I.C.S. (Hon.)
Nashville, Tennessee

Henry M. Scheer, M.D., F.A.C.S., F.I.C.S.
New York City, New York

Jorge Taiana, M.D., F.I.C.S.
Buenos Aires, Argentina

Philip Thorek, M.D., F.A.C.S., F.I.C.S.
Chicago, Illinois

Stephen A. Zieman, M.D., F.A.C.S., F.I.C.S.
Abstract Editor
Mobile, Alabama

PUBLICATIONS COMMITTEE

Philip Thorek, M.D., Editor-in-Chief, Chairman

Rudolph Nissen, M.D.
Henry W. Meyerding, M.D.
Arnold S. Jackson, M.D.
Edward L. Compere, M.D.

SUMMARY EDITORS

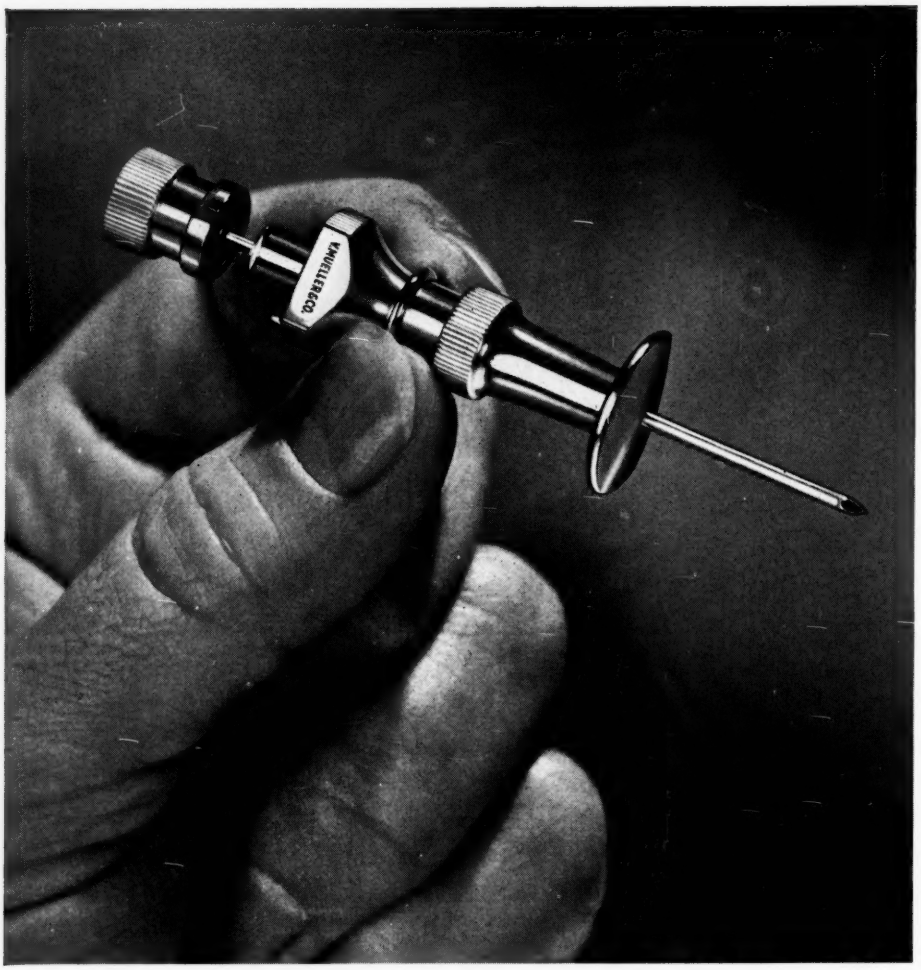
Dr. Manuel de Cardenas
San Sebastian, Spain
Spanish

M. Edwin Fawer
Geneva, Switzerland
French

Dr. Antonelio Franchini and Dr. Martin Mini,
Bologna, Italy
Italian

Dr. Fritz Rothbart
Chicago, Illinois
German

David Serson Neto, M.D.
Sao Paulo, Brazil
Portuguese



to make the most of your talents and techniques . . .

University of Illinois Sternal Needle

V. Mueller research simplifies a dependable technique. Efficient for bone marrow aspirations from sternum, iliac crest, vertebra, tibia, femur, internal malleoli; also for marrow infusions. Depth of 15G, 1-inch cannula is adjustable; stylet locks in place. Stainless steel. Order as No. SU-21000, each $14.50.

VMUELLER & CO.

Fine Surgical Instruments and Hospital Equipment Since 1895

330 S. Honore Street, Chicago 12, Illinois

Dallas • Houston • Los Angeles • Rochester, Minn.

II